NORTHEAST ELECTRONICS
Division of northern telecom
Airport Rd., Concord, N.H. 03301•(603) 224-6511•TELEX 94-3453

INSTRUCTION MANUAL

MODEL 2762

MF AND LOOP SIGNALING DISPLAY

PRINTED IN U.S.A.

1.0M-2762-0978

No. A2762-02-600 ISSUE 6 DATE JUNE 1976

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SECTION 1

DESCRIPTION

1.1 INTRODUCTION.

1.2 The Northeast Electronics Model 2762 family of MF and Loop Signaling Displays are solid-state, bridging test sets that display monitored MF codes, digits, supervision and loop or E&M dial pulsing appearing on standard two-wire or four-wire trunks. Options 4 and 5 are suitable for complete monitoring of CCITT # 5 signaling systems.

1.3 The Model 2762 test set provides the following: a display of each valid MF tone or dial-pulsed digit received; MF codes; a collective display of up to sixteen digits that can be reset by three preselected modes of operation (automatic, remote, or manual); automatic and manual signal level gain controls, which are instrumental in diagnosing low level signals or excessive differences in transmission levels; an indication of MF transmissions having other than two component frequencies (Error Function); a speaker for audio monitoring; an adjustable pulse width control to help diagnose marginal or faulty signal transmission; supervisory information including off-hook, line reversal, E&M conditions and, with options 4 and 5, 2400 Hz and 2600 Hz on two-or four-wire trunks; an auxiliary output connector that provides digital data (in BCD format), MF codes, data present and clear, supervision, and error indications in TTL format for use with auxiliary equipment such as printers, computers, or the Northeast Electronics Model 2765 Call Disposition Analyzer. The use of printers or computers will require interfacing circuitry.

1.4 One of the many applications of the Model 2762 is in the Model 2765 Call Disposition Analyzer System, in which the Model 2762 monitors individual trunks via a trunk access unit. The Model 2762 interprets the signaling on the trunk and relays the data to the Model 2765 unit for processing.

1.5 All 2762 Models operate from either 115V or 230V, 50-60 Hz. This is switch-selectable with a front panel slide switch.

SECTION 2

SPECIFICATIONS

2.1 INTRODUCTION.

2.2 Table 2—1 lists the specifications for the Model 2762.

Table 2—1. Model 2762 Specifications.

ELECTRICAL

MF,DP, and SF (VF) Receivers (L1 & L2) SF (VF) Receivers on Options 4 and 5 only).

Input Impedance:	Greater than or equal to 20 kohm, dc blocked.
Input Isolation:	1 Megohm to ground.
MF Minimum Sensitivity:	
AGC	—25 dBm.
AGC (Options 4,5)	—30 dBm.
MAN	—23 to —3 dBm adjustable.
MF Dynamic Range:	
AGC	31 dB.
MAN	20 dB (+3 dB, —0 dB of MIN REC LEVEL control setting).
Compound SF Minimum Sensitivity:	—30 dBm.
Compound SF Dynamic Range:	31 dB.
Single SF Minimum Sensitivity:	—25 dBm.
Single SF Dynamic Range:	31 dB.
Maximum Difference in Transmission Level Between Two Simultaneous Tones (MF or Compound SF):	6 dB.
SF Receivers:	Two per channel, 2400 and 2600 Hz.
SF Filter Band Widths:	± 25 Hz minimum.
MF Filter Band Widths:	
AGC	3% to 5% of center frequency.
MAN	Depends on signal level and manual gain setting.

Table 2—1 (cont'd).

Minimum Pulse Width:	12 ms, ± 5 ms, to 100 ms, ± 5 ms adjustable.
Minimum Interval Between Pulses:	10 ms.
Minimum MF Error Signal Pulse Width:	12 ms.
Minimum Four-Wire Seizure Signal to Effect Reset:	95 ms (Options 4 and 5 only).
Remote Reset:	
Reset Command	Switch closure T to R (less than or equal to 100 ohms) or TTL/DTL/RTL logic 0 (R = ground).
Command Sequence	Open (logic 1) for greater than or equal to 10 ms prior to closure (logic 0), closure greater than or equal to 5 ms.
Command Current (logic 1)	less than or equal to 0.1 mA, source or sink.
External Equipment Reset:	
Contact Rating	10 watts resistive, 50 V or 0.5A maximum.
Supervision Display:	
E Lamp Lit	V_{tip} more negative than −10 V, or open.
E Lamp Extinguished	V_{tip} more positive than −10 V.
M Lamp Lit	V_{ring} more positive than −22 V, or open.
M Lamp Extinguished	V_{ring} more negative than −23 V.
L1 2400 Lamp Lit	2400 ± 25 Hz present on L1, level from −25 to +6 dBm.
L1 2600 Lamp Lit	2600 ± 25 Hz present on L1, level from −25 to +6 dBm.
L2 2400 Lamp Lit	2400 ± 25 Hz present on L2, level from −25 to +6 dBm.
L2 2600 Lamp Lit	2600 ± 25 Hz present on L2, level from −25 to +6 dBm.
OFF HOOK Lamp Lit	V_{tip} or V_{ring} more positive than −2.8V (internally adjustable −0.6 to −5.1) or open.
OFF HOOK Lamp Extinguished	V_{tip} and V_{ring} more negative than −2.8V (internally adjustable −0.6 to −5.1).
LINE REV Lamp Lit	V_{tip} more negative than V_{ring} or both open (subject to position of S8).
LINE REV Lamp Extinguished	V_{tip} more positive than V_{ring} (subject to S8 position).

Table 2—1 (cont'd).

Supervision Input Current:	
SUPV jacks:	
V_{in} = 0 volts	I_{in} less than or equal to 1.5 mA (source).
V_{in} = −48 volts	I_{in} less than or equal to 0.1 mA (sink).
L1, L2 Input Current:	
V_{in} = 0 volts	I_{in} less than or equal to 10 microamp (source).
V_{in} = −48 volts	I_{in} less than or equal to 300 microamp (sink).
Audio (L1 or L2):	
Input Impedance:	Greater than or equal to 20 kohms, dc blocked.
Input Level:	−35 dBm to +10 dBm per line.
Output:	−35 dBm ± 4 dBm, to −11 dBm, ± 4 dBm (with −25 dBm input) dependent on setting of volume controls.
Accessory Start:	
Contact Rating:	230 V, 1A maximum.
Power:	115 ± 10 Vac, 50/60 Hz, 60 watts, or 230 ± 20 Vac, 50/60 Hz, 60 watts.

ENVIRONMENTAL

Operating:	
Ambient Temperature:	+25°C, ± 10°C.
Relative Humidity:	0 to 85%.
Storage:	
Ambient Temperature:	0°C to +70°C.
Relative Humidity:	0 to 85%.

Table 2—1. (cont'd).

MECHANICAL

Outside Dimensions:	
Model 2762 (Including Option 4):	8.25-in. h x 14.0-in. w x 14.25-in. d (21.0 cm w x 35.6 cm h x 36.2 cm d).
Model 2762R (Including Option 5):	19.0-in. w x 8.72-in. h x 9.88-in. d (48.3 cm w x 22.1 cm h x 25.1 cm d).
Handles:	
(Including Option 4):	1.375-in. beyond front panel (3.5 cm).
(Including Option 5):	1.250-in. beyond front panel bezel (3.18 cm).
Mounting Model 2762R and Option 5:	Standard 19-in. rack spacing (48.3 cm).
Weight:	Approximately 31 lb. (14.1 kg.).

GENERAL

Numeric Display:	
Type	Single plane neon dot matrix.
Capacity	16 digits simultaneously.
Character Size	0.4-in. h x 0.28-in. w (1.02 cm h x 0.71 cm w).
MF Codes:	
Type	Individual LEDs with caption.
Codes	KP1,KP2/ST2P, ST, CD11/ST3P, CD12/STP.
MF Frequencies:	
Type	Individual LEDs with caption.
Frequencies	700, 900, 1100, 1300, 1500, and 1700 Hz.
SF (VF) Frequencies (Options 4 and 5):	
Type	Individual LEDs with caption.
Frequencies	L1 - 2400, L1 - 2600, L2 - 2400, L2 - 2600.
Reset:	
Type	Automatic (KP1 or KP2/ST2P or OFF HOOK or (Options 4 and 5) SF Seizure, remote (REM), or manual (MAN) reset modes.

SECTION 3

INSTALLATION AND OPERATING INSTRUCTIONS.

3.1 INTRODUCTION.

3.2 This section contains installation and operating instructions for the TTS 2762 family of MF & Loop Signaling Displays. The operating instructions are identical for the units, except as noted. Table 3—1 lists the functions of the controls, indicators, and connectors, most of which are shown on Figure 3—2 with their reference designators. Table 3—2 explains patching and basic control positions for two-wire and four-wire operations. Table 3—3 reemphasizes CAMA operation control settings, Table 3—4 lists the multifrequency digits and codes recognized by the TTS 2762. Table 3—5 is a glossary of equivalent terms used in the R1 and CCITT #5 Signaling Systems Paragraphs 3.7 through 3.61 provide the necessary information for the operation of the TTS 2762.

3.3 VISUAL INSPECTION.

3.4 Examine the TTS 2762 for obvious damage in shipping. Check the numeric display housing for cracks.

3.5 INSTALLATION AND PREPARATION.

VERSION	TITLE	AC POWER	MOUNTING
2762	MF & Loop Signaling Display	115V/230V	Portable
2762R	MF & Loop Signaling Display	115V/230V	Rack
Option 4	MF & Loop Signaling Display With SF (VF) Supervision	115V/230V	Portable
Option 5	MF & Loop Signaling Display With SF (VF) Supervision	115V/230V	Rack

3.6 Normally the 2762, 2762R and options 4 and 5 are shipped with the 115V/230V power select switch set to the 115V position. Before inserting the power cord into the main power source, check to ensure that the front panel 115V/230V power switch is set to match the main power source to be used. In addition, all 2762 and 2762R models with the exception of options 4 and 5 are strapped for R1 signaling. Options 4 and 5 are strapped for CCITT No. 5 signaling. To change the strapping, refer to Figure 6—10 for strapping locations. These are also shown on schematic diagram Figure 7—9.

CAUTION

For reasons of safety and for reliable dial pulse operation, it is essential that the unit have an earth ground connection. A proper ground can be ensured by either of the following methods. When connecting the Belden power cord to an outlet, do not isolate the NEMA ground lead (central prong of power plug J16) and check the outlet to ensure that the third lead is connected to earth ground; or, if the ac-power plug must have the ground lead isolated, strap the ground lead to a clean main-frame ground or connect a strap from connector J1 to a clean main-frame ground.

3.7 Table 3—1 provides a functional description of controls, indicators and connectors, most of which are shown on Figure 3—2.

3.8 OPERATIONAL CHECK.

3.9 Remove the power cord from the Model 2762 cover compartment and connect it to the power plug. Turn AC POWER switch S4 off. Insert the other end into a 115 Vac, 50/60 Hz source (230 Vac, 50/60 Hz). Check position of 115-230V switch S5 to match source.

3.10 Without additional connections to the unit, perform the following pre-operation checkout procedure:
Turn AC POWER switch S4 on. The frequency lamps may flash on or remain on. The E&M, OFF-HOOK, and LINE REV lamps will light; the SF lamps will not. Some of the MF code lamps may be on; the numeric display may have random digits or symbols.

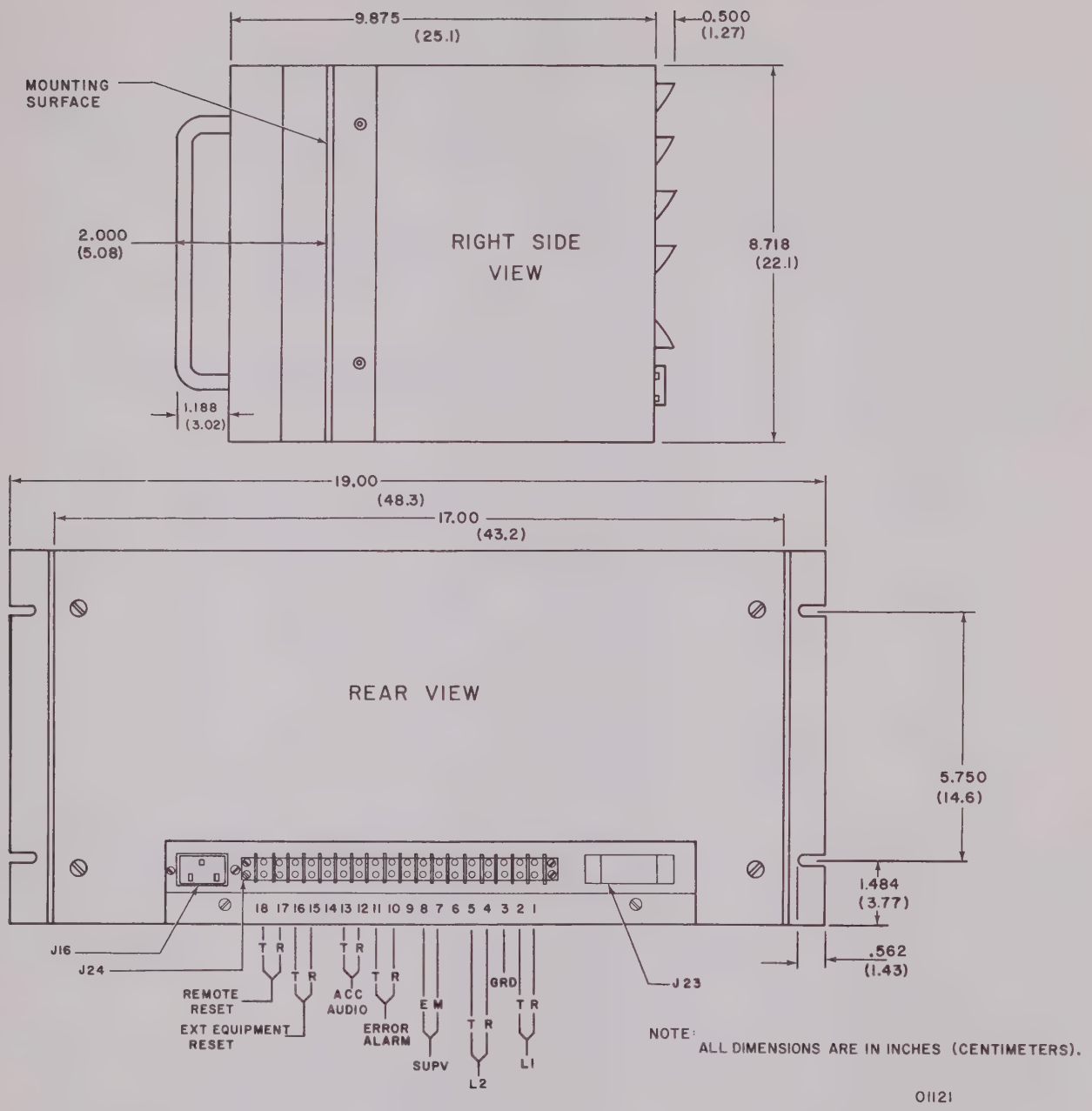


Figure 3—1. Model 2762R Installation Drawing.

Table 3—1. Controls, Indicators, and Connectors.

REF DESIG	CONTROL,INDICATOR OR CONNECTOR	FUNCTION
F1	One ampere ac power fuse (Slo blo)	Provides 1A protection through the phase input lead.
F2	Two ampere ac power fuse (Slo blo)	Provides 2A protection through the return or neutral input lead (or through the second phase lead in 230 Vac systems).
J1	Chassis ground banana jack binding post	Connector for an external common ground connection.
J2-J5	L1 jacks	Connected in parallel, J4, J5, and banana jack binding posts (J2 and J3) provide access to dc-blocked, high-impedance input for monitoring MF, SF, and audio signaling and access to high-impedance input for loop DP signaling.
J6,J7	L2 jacks	Connected in parallel, J6 and J7 provide access to dc-blocked, high-impedance input for monitoring MF, SF, and audio signaling and access to high-impedance input for loop DP signaling.
J8,J9	E&M jacks	Provides two parallel-connected 310 jacks for monitoring E and/or M supervision and, via display function switch S1, E or M dial pulsing for display. The tip of both jacks are connected to the E off hook detector; the ring portion of each jack to the M off hook detector.
J10	ERROR ALARM jack	After reception of an MF error signal, a dry, relay contact closure is provided, rated at 230 Vac, 1A. Contacts open upon reception of a reset command.
J11	ACC AUDIO jack	Provides a combined output of the monitored signal on L1 and L2 inputs, depending on volume control settings (R1, R2), but independent of display function switch S1 position. (Input impedance is 1 kohm, with ring at chassis ground).
J12	EXT EQUIP RESET jack	Provides a dry, relay contact closure across tip and ring when a remote or manual reset command is received. Contacts are rated at 50V, 10 watts or 0.5A.
J13-J15	REMOTE RESET T-R banana jack, binding post and 310 jack	Inputs for reception of remote reset commands in the form of a contact closure across tip and ring (less than or equal to 100 ohms) or TTL/DTL/RTL logic 0 (R = ground).
J16	115/230 VAC recessed plug (located on rear of rack mounted units).	Input connector for ac power.

Table 3—1. (cont'd)

REF DESIG	CONTROL, INDICATOR OR CONNECTOR	FUNCTION
J23	Accessory output connector (located on rear of rack mounted units).	Provides TTL information concerning MF and dial pulsed digital data (in BCD format), MF codes and frequencies, data present and reset, supervision (including line reversal and off-hook), and error indications, and a remote reset input. These outputs have a fanout of two and are intended for use with auxiliary equipment such as Model 2765 Call Disposition Analyzer, printers and computers.
J24	Jones strip connector (on rear of rack-mounted units only).	Provides hard wiring terminations for permanent installation of rack-mounted units. Located on rear of these units, contacts are connected in parallel with all front panel input jacks.
LS1	Speaker	Provides audio range sounds present on L1 and L2, dependent on volume control (R1, R2) settings.
R1,R2	VOLUME L1, L2 controls (dual potentiometer)	Vary speaker volume and output level to ACC AUDIO jack of input signals monitored on L1 and L2.
R3	MIN REC LEVEL (−3dB to −23dB) control	With AGC/MAN switch S3 in MAN position, this control varies level of input MF signal below which there will be no display.
R4,R5	MIN PULSE WIDTH dual control (12 ms to 100 ms)	Provides adjustment for setting minimum acceptable pulse width of any MF signal or dial pulse.
S1	DISPLAY FUNCTION switch	Selects either or both input channel for MF or DP decoding and display.
S2	RESET switch (AUTO, REM, MAN)	In AUTO position, digital, code, and frequency (if frozen) lamp displays automatically reset with each KP1 (or KP2 in options 4 and 5) on-hook/off-hook transsition (on-hook greater than/equal to 210 ms, off-hook greater than/equal to 60 ms) or, with Options 4 and 5, with four-wire SF seizure signal, or with a remote reset. In REM position, displays are not reset automatically by a KP, off-hook, or seizure signal, but instead require a remote reset from an external source via REMOTE RESET jacks J13 or J14 and J15. Refer to Section 2 for remote reset command specifications. The external equipment relay will operate with each remote reset command. MAN position is a momentary operation. At any time RESET switch can be depressed to this position for local reset of code and digital displays, error indications, if any, and for operating external equipment reset relay.

Table 3—1. (cont'd)

REF DESIG	CONTROL, INDICATOR OR CONNECTOR	FUNCTION
S3	AGC/MAN switch	In AGC position, unit will accept MF signal levels from −25 to +6 dBm (−30 to +1 dBm in options 4 and 5). MAN position allows selective minimum MF input level using MIN REC LEVEL control (−3 to −23 dBm).
S4	POWER switch	Applies ac power to internal circuitry in upper position.
S5	115/230 slideswitch	Switch allows TTS 2762 to operate from either 115 Vac or 230 Vac.
S6	CAMA FUNCTION switch (Opt. 0,1,2, 3 only)	MF-DP position expands capability of DISPLAY FUNCTION switch S1: DP-L1 position displays MF appearing on L1 and/or L2. MF-MF position causes digital display to latch on second start signal encountered instead of first.
S7	ERROR FUNCTION switch	In OFF position, digital display ignores erroneous MF transmissions. When ON, this control enacts three functions upon receipt of any MF signal not having two component frequencies; frequency lamps on at time of error are frozen on; digital display generates a colon (:); and ERROR ALARM relay operates. Subsequent errors are acknowledged by a colon while proper MF is displayed as such. All conditions are reset by a reset command; reception of a start disables Error Function circuit.
S8	internal	Reverses tip and ring leads to Line Reversal Detector on A10 when alternate Line Rev lamp logic is desired.
T1	internal	Power transformer accepts at its primaries ac power through 115/230 VAC switch S5 and produces at its secondaries raw ac levels needed to provide working internal dc supply potentials: +250V, +5V, ± 12V.
U1	Numeric Display	Displays up to 16 digits simultaneously with any spill-over replacing previously displayed digits, starting with first digit.

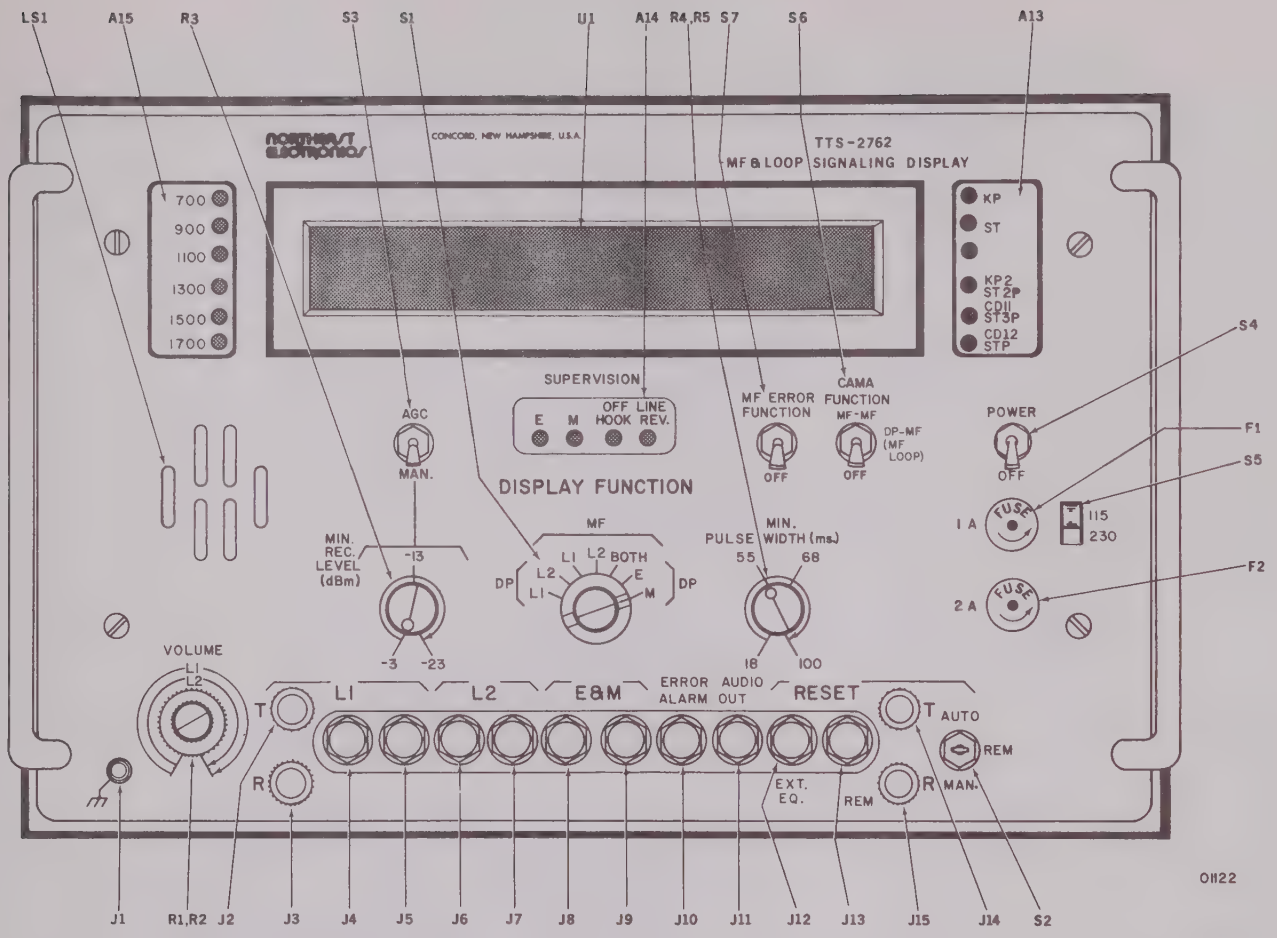


Figure 3—2. Model 2762 Controls, Connectors, And Indicators.

3.11 NORMAL CONTROL SETTINGS.

3.12 After performing the operational check, set the Model 2762 controls as follows. These settings are generally acceptable for simple transmission monitoring; use of the various diagnostic aids is described in subsequent paragraphs.

a. Set VOLUME controls R1, R2 to midrange.

b. Set MAN/AGC switch S3 to AGC. This disables MIN REC LEVEL —3/—23 dB potentiometer control R3.

c. Determine number of pairs of transmission wires to be monitored and type of supervision desired, if any. Refer to Table 3—2 for patching and for setting of DISPLAY FUNCTION switch S1.

d. Turn ERROR FUNCTION switch S7 OFF.

e. Set MIN PULSE WIDTH control R4 and R5 to 55 ms.

f. Turn CAMA FUNCTION switch S6 (not included on Options 4 and 5) to OFF.

g. Set RESET switch S2 to AUTO position.

3.13 NORMAL TRANSMISSION OBSERVATION.

3.14 No further adjustment of the controls is necessary in order to display normal MF, Loop DP, or E or M DP transmission, unless the pulse widths of the tones or pulses are shorter than the setting of the MAN PULSE WIDTH control R4 and R5, in which case an adjustment in the counter-clockwise direction may be required. Dial pulse supervision activity will be indicated

on the input channel chosen by the position of DISPLAY FUNCTION switch S1: DPL1 or DPL2, OFF HOOK lamp off = off-hook, LINE REV lamp off = LINE REVERSAL (adjust S8 if desired for opposite polarity loops); "E DP", OFF HOOK and E lamps off = E off-hook; M DP, OFF HOOK and M lamps off = M off-hook. E and M supervision status on MF trunks will be indicated on the E&M lamps regardless of the position of DISPLAY FUNCTION switch S1. If SF supervision is present on either input channel of Options 4 or 5 of the Model 2762, the proper SF lamp will light. For example, 2400 Hz on L1 = L1 2400 lamp on; or 2400 Hz and 2600 Hz on L2 = L2 2400 and L2 2600 lamps on. The OFF HOOK (and E or M lamps during E or M dial pulsing) lamp flashes during dial pulsing. The presence of MF codes and digits will be demonstrated by the lighting of the proper pair of lamps for the tone duration. MF code lamps will light after the reception of their respective signals and until reset. MF and DP digits will be displayed in the order received from left to right. If more than sixteen digits are included in any sequence, the seventeenth will replace the first on the digital display, the eighteenth will replace the second, etc. . Switching transients, tones, and speech will be audible on speaker LS1. KP1 tones (KP1 or KP2 in options 4 and 5) on-hook /off-hook transitions of specified duration, and SF seizure signals (options 4 and 5 only) will extinguish all code and digital displays; an ST, STP, ST2P, or ST3P signal latches the digital display to prevent speech from falsely activating digits or symbols (reset commands release the latch). In options 4 and 5, a latch is caused only by an ST signal.

3.15 Automatic Reset Operation.

3.16 When RESET switch S2 is in the AUTO position in MF operations, the digital, frequency, and code lamp displays will be extinguished by a KP1 (KP1 or KP2 in options 4 and 5) signal and, with Options 4 and 5, an SF seizure signal. Also, the ST latch is released to enable digital display; and the ERROR ALARM jack tip-ring contacts are no longer shorted by the error alarm relay if an error had previously been detected. In dial pulse operations, an on-hook period of about 210 milliseconds followed by an off-hook state lasting longer than 60 milliseconds effects a reset command to clear all displays. If storage of a given transmission is required, the RESET switch should be placed in the REM position.

3.17 REMOTE RESET OPERATION.

3.18 In this mode of operation, the frequency, code, and digital displays will not reset automatically, but only when triggered by a remote or manual reset command. The ST latch function will inhibit clearing of, or MF additions to, the digital display when in this mode of operation, thus storing the last received call until a remote or manual reset command is received. For remote reset operation, connect external reset command source to REMOTE 310 jack J13 or T-R banana jack binding posts J14 and J15. Refer to Specifications for REMOTE RESET commands. Set RESET switch S2 to REM position.

CAUTION

Only a tip-ring closure or a TTL/DTL/RTL logic 0 is required to effect a remote reset. Neither the idle nor active state of the tip input to the REMOTE RESET jacks should exceed TTL/DTL/RTL voltage limits of −0.5 to +5.5 Vdc. Exceeding these limits may cause an internal fuse to blow, disabling the REMOTE RESET circuit.

3.19 DIAGNOSITC OPERATION IN MULTIFREQUENCY (MF) SIGNALING SYSTEMS.

3.20 The Model 2762 is helpful in troubleshooting marginal or inoperative MF systems. The line under observation is assumed to be out of service so that a known sequence of MF pulses can be sent at machine or manual rates.

3.21 DETECTING INSUFFICIENT OR EXCESSIVE COMPONENT FREQUENCIES; THE ERROR FUNCTION.

3.22 The Model 2762 can be used to determine when only one or more than two frequencies in an MF signal are being transmitted simultaneously.

3.23 When ERROR FUNCTION switch S7 is OFF, frequency lamps light for the duration of tone presence at the input jack. If any signal occurs in which the number of component MF frequencies is other than two, or in which either frequency is faulty with respect to level or bandwidth, then MF decoder A8 ignores that input and no digital or code display is presented. However, any frequency lamp will light if the proper tone is within the limits of level and bandwidth. If a known sequence of digits is sent at manual send speeds, the absence of proper lamp pairs may be observable; at machine sender speeds, however, (up to 20 pulses per second) correct diagnosis may be impossible to achieve by lamp observation. The Error Function circuitry enables the operator to quickly and accurately identify missing or extra frequencies in any MF tone bursts lasting longer than approximately 12 milliseconds.

Table 3—2. Display And Supervision Control Settings And Patching.

TYPE OF SIGNALING	SUPV.	NO. PAIRS	DISPLAY FUNCTION SWITCH S1 POSITION	PATCHING NOTES 1, 2		CAMA FUNCTION SWITCH S6 POSITION	SUPERVISION LAMPS AFFECTED
				FROM 2762	TO PATCH BAY		
1) MF	E&M	1	MF L1 or MF L2	L1 or L2 E&M	T1 and R1 E Lead and /or M Lead	OFF	E and/or M (note 3)
2) MF	E&M	2	MF Both	L1 L2 E&M	T1 and R1 T2 and R2 E Lead and M Lead	OFF	E and M (note 3)
3) MF	SF (note 4)	2	MF Both	L1 L2	T1 and R1 T2 and R2	OFF	L1 2400,L1 2600 L2 2400,L2 2600
4) MF	Loop	1	DP L1	L1	T1 and R1	DP-MF	OFF HOOK & LINE REV
5) Loop DP	Loop	1	DP L1 or DP L2	L1 or L2	T1 and R1	OFF	OFF HOOK & LINE REV
6) Loop DP	Loop	2	DP L1 or DP L2	L1 L2	T1 and R1 T2 and R2	OFF	OFF HOOK & LINE REV
7) E DP (note 5)	E	1	DP E	E&M	E Lead	OFF	E and OFF HOOK
8) M DP (note 5)	M	1	DP M	E&M	M Lead	OFF	M and OFF HOOK
9) MF-MF (CAMA*)	E&M	1	MF L1 or MF L2	L1 or L2 E&M	T1 and R1 E Lead and/ or M Lead	MF-MF	E and/or M
10) Loop DP-MF (CAMA*)	Loop	1	DP L1	L1	T1 and R1	DP-MF	OFF HOOK & LINE REV
11) Loop DP MF	Loop	2	DP L1	L1 L2	T1 and R1 (DP) T2 and R2 (MF)	DP-MF	OFF HOOK & LINE REV
12) E DP-MF (CAMA*)	E	1	DP E	E&M L1	E Lead T1 and R1	DP-MF	E and OFF HOOK
13) M DP-MF (CAMA*)	M	1	DP M	E&M L1	M Lead T1 and R1	DP-MF	M and OFF HOOK

TABLE 3—2 NOTES

1. In all cases make connections from the Model 2762 to the patch bay to maintain continuity in the transmission path. Always use 241 jacks (dual 310) unless bridging monitor plugs are available, in which case single 310 jacks can be used. Otherwise, the transmission path may be opened and an on-hook condition imposed.

2. L1 and L2 are continuously monitored for audio reproduction via the speaker or the ACC AUDIO jack.

3. The Model 2762 will function properly without E&M supervision except that the E&M lamps will remain constantly lit.

4. SF Detectors are included in Options 4 and 5 only, and are independent of any front panel controls.

5. If voice monitoring is desired during E and/or M dial pulse detection, connect transmission path to the L2 jack(s).

6. * See paragraph 3.53 for detailed instuctions concerning CAMA trunk monitoring.

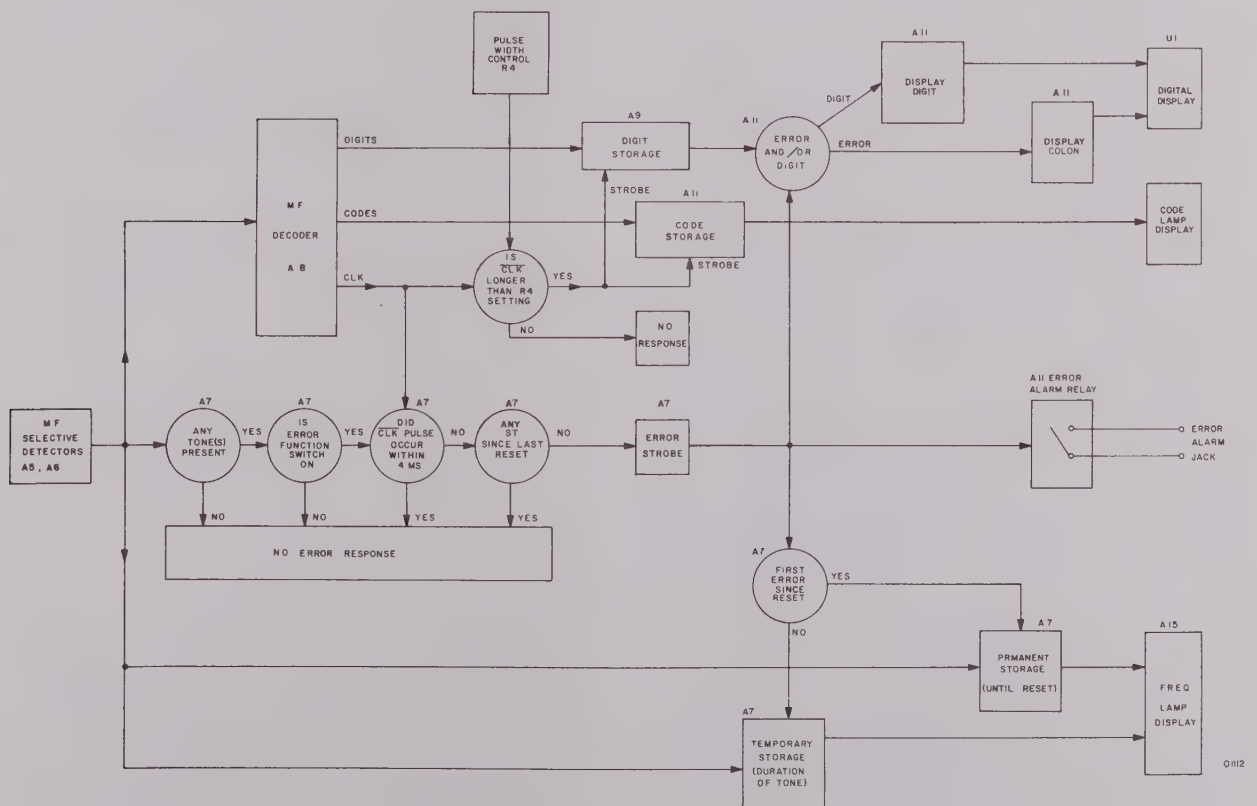


Figure 3—3. Model 2762 MF Error Sequence Flow Chart Diagram.

3.24 As shown on Figure 3—3, the indication of any MF tone(s) from the detectors initiates a sequence of events that is continued when Error Function Switch S7 is on. A CLK pulse from Decoder A8, signifying the presence of correct two-and-only-two-out-of-six MF tones cancels the error sequence if it occurs within four milliseconds of the start of either component frequency. The reception of any start pulse (ST in options 4 or 5) ST, STP, ST2P, or ST3P in all other versions, since the last reset command will also cancel the error sequence, in order that speech and switching transients will not cause false error indications. If all error conditions are met for a given tone, then the error strobe forces the digital display U1 to exhibit a colon, activates the Error Alarm Relay, and, if no other error has occurred since the last reset command, freezes those frequency lamps on which corresponding tones were present at the time of the error strobe. If a previous error had been registered, then an additional colon would be generated but no additional frequency lamps would be held on. The subsequent reception of proper MF would be exhibited via the corresponding digit or colon and the proper frequency lamps would be held on only for the duration of the tone.

3.25 EXAMPLES OF ERROR FUNCTION OPERATION.

3.26 Suppose the Model 2762 presents the following information after an MF transmission: 1300 Hz lamp lit; KP and ST lamps lit; digital display reads, "0::6:6::5:6." Assuming the error is consistent in any one transmission, one can eliminate from consideration those frequencies present in the codes (KP and ST) and digits (0, 5,6) which did decode properly (see Table 3—4). By deduction, the 700 Hz sender is inoperative, since 700 is the only frequency not a component of 0,5,6,KP, or ST. Now, suppose the Model 2762 presents the following information: 700,1100, and 1300 Hz lamps lit; KP code lamp on only; digital display reads, 22:::66. Assuming a consistent error and by checking the component frequencies of the code (KP) and digits (2 and 6) which did decode properly, one finds that 1100 Hz is the only frequency common to all three and is also one of the frozen lamps. Therefore, the 1100 Hz sender is activated for every pulse.

3.27 Interpretation of Error Indications. The aforementioned error indications may result from many sources, some of which may not result in erroneous transmissions due to register discrepancies. For example, transmission line MF receivers may be far more tolerant of transmission level differences (e.g., twist), bandwidth, or compound frequency tolerance (delay in start between two component frequencies of a given MF signal) than is the TTS 2762. For example, R1 specifications indicate a maximum receiver compound frequency tolerance of ± 6 milliseconds. If, on an actual trunk, the 'start delay' exceeds four milliseconds, the Model 2762 will declare an error present while MF registers may accept the signal.

3.28 DETECTING EXCESSIVE DIFFERENCE IN TRANSMISSION LEVELS OR TOO LOW COMPOUND SIGNAL LEVELS.

3.29 If particular MF signals, or groups of signals using a common frequency, fail to register correctly even on manual sending, one or more of the MF frequencies may be significantly lower than the others in amplitude. If registration is generally erratic, even on slow manual sending, the signals may all be too low in amplitude. The automatic gain control of the 2762 will enable the reception of signal levels from −25 to +6 dBm (−30 to +1 dBm in options 2,3,4, and 5).

3.30 Connect the Model 2762 to the line in question, as described in paragraph 3.12. Using a manual sender, slowly transmit a known sequence of MF signals including all digits. Observe the frequency lamps during signal transmission and check for proper lamp pairs lighting during transmission of their associated frequencies (refer to Table 3—4). If the expected display for the known sequence of MF is in error, excessive transmission level differences may be present. That is, one or more of the frequencies in any pair may be 6 dB or more below its complement (due to twist, differences in sender output levels, etc.).

3.31 When the proper transmission level on the trunk is known, check the frequencies as follows: Set AGC/MAN switch S3 to MAN position; set MIN REC LEVEL control R3 slightly lower than proper transmission level (e.g., proper level = −12 dBm; set MIN REC LEVEL control to approximately −14 dBm). Transmit a known sequence of MF signals, representing all digits and at least one code. While the known sequence of MF is being transmitted, observe the frequency too low in level to be displayed. The Error Function may be employed to investigate failures of this type if the send rate is too high.

3.32 For example: MF signals KP, 1,3,6,0, CD11/ST3P ST are transmitted. The display shows KP,1,0,CD11, and ST. Digits 3 and 6 were not displayed and are found (Table 3—4) to have a common frequency of 1100 Hz which is not part of any code or digit which did decode properly. Therefore, the 1100 Hz sender is generating a signal considerably lower in level than the other component frequencies of digits 3 and 6 (900 Hz and 1300 Hz).

3.33 Since the frequency levels may be staggered, the best test is to receive with the Model 2762 a known sequence of transmitted MF signals representing all possible codes and digits recognized by the instrument.

3.34 If the proper transmission level on the monitored trunk is unknown, set the MIN REC LEVEL control to −23 dB and slowly rotate the control counter-clockwise during transmission until an inconsistent display is obtained. Note the codes or digits which failed to register properly; then turn the control clockwise until the same codes and digits are displayed consistently. The position of the MIN REC LEVEL control will indicate the approximate level of the codes or digits noted.

3.35 The lower signal level threshold of the unit is more sensitive than the upper threshold. For example, with the MIN REC LEVEL control set at −10 dB, a signal of −13 dBm would probably not be accepted, whereas a signal level of −7 dBm would.

3.36 DETECTING SHORT MF PULSES (MACHINE SENT).

3.37 If MF signaling errors are noted on machine-pulsed numbers, but not on manually pulsed numbers from the same MF oscillators, too short a pulse width may be the cause. The Model 2762 can be used to determine if short pulses are being sent or received. Since channel distortion is possible, a valid transmitted signal from office A does not guarantee a valid received signal at office B, however. Both ends of the circuit should be checked.

3.38 To check for short MF pulses and/or the approximate length of any MF signal pulses, proceed as follows. Connect the Model 2762 to one end of the line in question as directed in paragraph 3.12. Transmit a known sequence of MF signals representing all digits from the suspect sender. Any signal having a pulse width shorter than the setting of MIN PULSE WIDTH control R4 will not be decoded and displayed. Repeat the transmission several times, each time adjusting the MIN PULSE WIDTH control clockwise by a small increment. This increases the minimum pulse width required by the instrument for display of any MF signal. In this manner the approximate pulse width of each pulse sent can be determined.

3.39 DIAGNOSTIC OPERATION IN DIAL PULSE SYSTEMS.

3.40 The Model 2762 can be helpful in troubleshooting marginal or inoperative dial pulse systems. The line under observation is assumed to be out of service so that a known sequence of dial pulses can be transmitted at machine or manual rates.

3.41 If signaling errors appear in the system, the Model 2762 can be used to detect whether too short a series of pulses for a known digit is being transmitted, or if the length of the transmitted pulses have too short a duration (pulse width, on-hook or break interval).

3.42 DETECTING MISSING DIAL PULSES.

3.43 To detect missing dial pulses, proceed as follows:

ACTION	RESULT
a. Connect Model 2762 to line in question as described in paragraph 3.12.	
b. Using a manual sender, transmit a known sequence of DP signals representing all digits.	Representative supervision lamps extinguish. (Refer to paragraph 3.16,d). Known sequence of digits will be displayed if dial pulses (on-hook time) are longer than the MIN PULSE WIDTH control setting of 18 ms. Speaker provides audio output of input signals on L1 and/or L2.

3.44 While the known series of DP signals are being transmitted, missing pulses can be detected by the following observations:

a. Hearing switching sounds monitored by speaker in loop dial pulsing (E or M dial pulsing is not monitored by speaker).

b. Visual observations of OFF HOOK lamp flashing with each pulse in a series.

c. Numeric display of monitored dial pulses having pulse widths longer than the MIN PULSE WIDTH control setting. This method of detection is particularly helpful when monitoring high speed transmission. The numeric display directly reflects the pulse count of each pulse train transmitted in a known sequence of DP signaling.

3.45 **DETECTING SHORT DIAL PULSES.**

3.46 The Model 2762 can be used to determine if one or more pulses in a series of pulses, representing a digit, have too short a duration (pulse width, on-hook or break interval). This can be done whether or not the standard pulse width of the sending equipment is known.

3.47 When only the standard speed (pulses per second) and percent break are known, the standard pulse width can be calculated using the following pulse width formula:

$$\text{Pulse Width (ms)} = \frac{\text{\% Break}}{\text{Speed (pps)}} \times 10$$

3.48 To determine if the DP signaling of the digits transmitted is correct, refer to paragraphs 3.44 a,b,c, and then perform the following steps.

ACTION	RESULT
a. Connect Model 2762 to line in question as described in paragraphs 3.13 through 3.16.	
b. Set MIN PULSE WIDTH control R4 and R5 a few milliseconds less than proper pulse width (e.g., If proper pulse width = 72 ms; set MIN PULSE WIDTH control to 68 ms).	
c. Transmit a known sequence of DP signals that represent all the digits on monitored trunk.	Representative supervision lamps extinguish. (Refer to paragraph 3.16,d). Known sequence of digits will be displayed if dial pulses (on-hook time) are longer than MIN PULSE WIDTH control R4 and R5 settings. Speaker provides audio output of input signals on L1 and/or L2.

3.49 If the Model 2762 display is incorrect because one or more pulses were unacceptable to the unit, note those digits in error and proceed to investigate them individually.

3.50 Turn MIN PULSE WIDTH control R4 and R5 counter-clockwise several milliseconds and transmit the DP signaling of a digit in question. Repeat this procedure with the same digit until the display agrees with the DP signaling. The MIN PULSE WIDTH control setting will indicate the approximate minimum pulse width in the DP signaling of the digit transmitted. Example: A 10 pps sender operating at 70 % break on a loop supervision trunk is causing the receiver to produce an occasional erroneous output. The DP signal of digit eight is being recognized by the receiver as the digit six. To diagnose this problem, proceed as follows:

a. Calculate the pulse width.

$$\text{Pulse Width} = \frac{70\ \%}{10\ \text{pps}} \times 10 = 70\ \text{ms}$$

b. Set MIN PULSE WIDTH control R4 and R5 to approximately 68 ms.

c. Since the DP signal for digit eight is in error, transmit several groups of eight dial pulses from the suspect sender for monitoring with the Model 2762.

d. Count the flashes of the OFF-HOOK lamp and listen for the switching sounds from the speaker during transmission. Assume that a six was displayed while eight pulses were heard.

e. Turn MIN PULSE WIDTH control R4 and R5 to approximately 60 ms and transmit the same signal. Assume that a seven is displayed.

f. Turn MIN PULSE WIDTH control R4 and R5 counter-clockswise a few more milliseconds and repeat the transmission. This is done until an eight is displayed.

g. This test has shown the approximate pulse widths to be; six pulses greater than 67 ms, one pulse greater than 60 ms, and one pulse greater than the last MIN PULSE control setting.

If the standard pulse width, percent break, or sender speed, is not known, the approximate minimum pulse width for a series of pulses may be determined by setting the MIN PULSE WIDTH control to 18 ms and alternating transmission of a series of pulses in question, with clockwise adjustments of the MIN PULSE WIDTH control. This is done until a feeling for the standard pulse width is obtained.

3.51 **SF (VF) FILTERS (Options 4 and 5 only).**

3.52 The Model 2762, Options 4 and 5, are equipped with 2400 Hz and 2600 Hz filters for each input channel. These filters have a maximum sensitivity of −30 dBm to compound SF and −25 dBm to single SF. Each filter drives a lamp on the SUPERVISION display on the front panel. Tone present = lamp on. Filter and lamp operation is not affected by any of the front panel controls. The outputs of the filters perform only one function besides controlling the lamps: generating a reset command upon receipt of an SF seizure signal. When L1 is monitoring the send path and L2 the receive, and an SF seizure signal occurs for at least 95 milliseconds, then a system reset occurs if RESET switch S2 is in the AUTO position. The Model 2762 defines SF seizure as 2400 Hz (but not 2600 Hz) present on L1 and 2600 Hz (but not 2400 Hz) present on L2 for a period of at least 95 milliseconds.

3.53 **OPERATION IN CAMA SYSTEMS.**

3.54 The Model 2762 (except options 4 and 5) can be used to monitor ANI/ONI (Autmoatic/Operator Number Identification) transmissions on CAMA (Centralized Automatic Message Accounting) trunks.

3.55 The anticipated sequence of the data that the Model 2762 will decode and display is as follows:

a. Off-hook (Loop or E&M).

b. Address: Loop Dial Pulse; E Dial Pulse; M Dial Pulse; MF (KP1, 7 or 10 digits, ST or STP or ST2P or ST3P).

c. Wink pulse (if any), the 140 ms off-hook/on-hook/off-hook transition; or off hook toward local office.

d. KP1.

e. One information digit, 0-7 (MF).

f. Calling number (seven MF digits).

g. ST,STP,ST2P, or ST3P.

h. Answer supervision (line reversal or E and M off hook).

3.56 **DATA INTERPRETATION.**

3.57 Interpret the data as follows:

a. Digital Data. Presented from left to right across the numeric display as received, whether MF, Loop DP, or E&M DP. If more than 16 digits are received before a reset command is issued, the seventeenth digit replaces the first, the eighteenth digit replaces the second, etc. .

b. MF Frequencies and Codes. The frequency lamps will remain lit for the duration of the tone present. The codes will activate the proper lamps when present. These code lamps remain lit until reset.

c. Line Status. The SUPERVISION lamps reflect the status of lines attached to the front panel jacks. Should L1 reverse, the LINE REV lamp will extinguish. Off-hook, dialing, and any wink pulse may be observed by the negative logic operation of the OFF HOOK lamp. The E or M lamps will operate in the same manner, and slightly ahead of the OFF HOOK lamp, when E&M dial pulsing is being monitored.

3.58 **CONNECTIONS, CONTROL SETTINGS, AND OPERATION.**

3.59 Set the controls as follow;

a. Set the VOLUME controls R1 and R2 to mid-range.

b. Set the MAN/AGC switch S3 to AGC.

c. Turn the ERROR FUNCTION switch S7 to OFF.

d. Set the MIN PULSE WIDTH controls R4 and R5 midway between 12 and 55 ms.

e. Push the POWER switch S4 to ON.

f. Connect tip and ring to L1 (J4, J5 or J2 and J3).

g. Connect the E and/or M lead, when appropriate, to the E&M jacks J8 and J9.

h. Set the DISPLAY FUNCTION switch S1 and CAMA FUNCTION switch S6 according to Table 3.3.

i. Set the RESET switch S2 to the MAN position momentarily and leave in REM position.

The instrument is now posed to interpret CAMA trunk signaling. A manual or remote reset command will be necessary after each full transmission to clear all

displays and release the ST latch feature. The CAMA FUNCTION switch position is off in E or M DP address situations since L1 is always accessed to the MF receivers when DISPLAY FUNCTION switch S1 is in the DP E or DP M position regardless of the setting of the CAMA Function switch. With the CAMA FUNCTION switch in the MF-MF position, the instrument is programmed to latch on the second start (ST or STP or ST2P or ST3P) signal received after a reset command rather than on the first ST.

3.60 **EXAMPLES OF CAMA OPERATION.**

3.61 The following sequence of data is presented as an example: KP 603 2247466 ST2P wink KP 3 5201612 ST. After the first series of digits has been received, the displays will read as follows: KP and ST2P code lamps on, digital display "6032247466 ". The wink pulse, if any, present on the E&M leads, will then be observed on the E&M lamps. The final digital display will read, "1232247466352016," the seventeenth and eighteenth digits having replaced the first and second. The instrument must now be reset by momentarily depressing RESET switch S2 to the MAN position and releasing to clear the displays and override the ST latch. Reset may also be accomplished remotely (see paragraph 3.18).

Table 3—3. CAMA Operation Control Settings.

	TYPE OF ADDRESS SIGNALING			
	LOOP DP	E DP	M DP	MF
DISPLAY FUNCTION (SWITCH POSITION)	DP L1	DP E	DP M	MF L1
CAMA FUNCTION (SWITCH POSITION)	DP-MF	DP-MF	DP-MF	MF-MF

Table 3—4. Multifrequency Signaling Recognized By the Model 2762

DIGIT	FREQUENCIES (HZ)
1	700 + 900
2	700 + 1100
3	900 + 1100
4	700 + 1300
5	900 + 1300
6	1100 + 1300
7	700 + 1500
8	900 + 1500
9	1100 + 1500
0	1300 + 1500

CODE	FREQUENCIES (Hz)	EXPLANATION	SYSTEM
KP	1100 + 1700	Prep. for Digits	
Coin Return	1100 + 1700	Coin Return	Coin Control
KP1	1100 + 1700	Prepare for Digits (Terminal Call)	CCITT # 5
ST	1500 + 1700	End of Pulsing Sequence	
STP	900 + 1700		TSPS
CD12	900 + 1700	Delay Operator	CCITT # 5
ST2P	1300 + 1700		TSPS
KP2	1300 + 1700	Prepare for Digit (Transit Call)	CCITT # 5
ST3P	700 + 1700		TSPS
Ringback	700 + 1700	Ringback	Coin Control
CD11	700 + 1700	Inward Operator	CCITT # 5
Coin Collect	700 + 1100	Coin Collect	Coin Control

Table 3—5. Glossary Of Equivalent Terms For R1 And CCITT # 5 Signaling Systems

R1		CCITT# 5	
TERM	**MEANING**	**TERM**	**MEANING**
MF	multifrequency	MF	multifrequency
SF	single frequency line signaling	VF	voice frequency
SF1	2400 Hz	VF	2400 Hz line signal
SF2	2600 Hz	VF	2600 Hz line signal
DP	dial pulse	DP	dial pulse
on hook		on hook	
off hook		seizure/answer	
supv	supervision	supervisory	line supervision
E&M		none	
CAMA	Centralized Automatic Message Accounting	none	
ANI/ONI	Automatic/Operator Number Identification	none	
TSPS	Traffic Service Position System # 1	none	
WECO 310 jack	tip and ring	BPO plug 316	tip and ring
dBrn	noise level	dBm	= dBrn — 90dB
STP,ST2P,ST3P	start pulses for various CAMA calls for TSPS	none	
none		CD11,CD12,KP2	inward/delay operator, transit call digit preparation

SECTION 4

CIRCUIT DESCRIPTION

4.1 INTRODUCTION.

4.2 The circuit descriptions appearing in this section are written on a functional block diagram level. The active components contained within the functional blocks are identified by their reference designators and are easily cross-referenced to the appropriate detailed schematic diagram in Section 7. The block diagram level description is based on six functional block diagrams of the overall schematic diagram, Figure 7—1. They represent the signal processing involved in audio reproduction and five major modes of operation, dependent on the DISPLAY FUNCTION and CAMA FUNCTION switch settings. The block diagram level descriptions are followed by detailed circuit descriptions keyed to the block diagrams and schematic diagrams.

4.3 BLOCK DIAGRAM DESCRIPTION.

4.4 REPRODUCTION OF AUDIO.

4.5 Referring to Figure 4—1, the signals appearing on the L1 and L2 inputs are monitored at all times via two high-impedance, dc-blocked transformers. The signals are then applied to two separate high-pass filters. At this point, the signals are also routed to transmission gates through two MF amplifiers, where MF signaling can be selected to be processed for display.

4.6 After the high-pass filters, the signals are amplified and applied to voltage dividers incorporating two volume controls, R1 and R2. The signals are summed, amplified, and routed to speaker LS1 and an attenuator. The output of the attenuator is connected to ACC AUDIO jack J11.

4.7 LOOP DP SIGNAL PROCESSING.

4.8 As shown on Figure 4—2, loop DP signaling appearing on L1 or L2 can be selected for monitoring by using DISPLAY FUNCTION switch S1 in the positions shown. This switch also provides a signal path from the loop dial pulse monitor to the 60 millisecond off-hook timer, on-hook timer, and pulse-width comparator.

4.9 Loop DP signaling appearing on the L1 input is routed to a reversing switch, a line reversal detector, and a loop dial pulse monitor via the DISPLAY FUNCTION switch. The line reversal detector inhibits the lamp driver, which in turn extinguishes the LINE REV lamp on A14.

4.10 The loop dial pulse monitor provides a positive-going pulse when off-hook conditions are monitored on the input. Thus, when dialing is initiated, the alternate off-hook/on-hook condition causes the dial pulse detector to produce a series of pulses. This output is

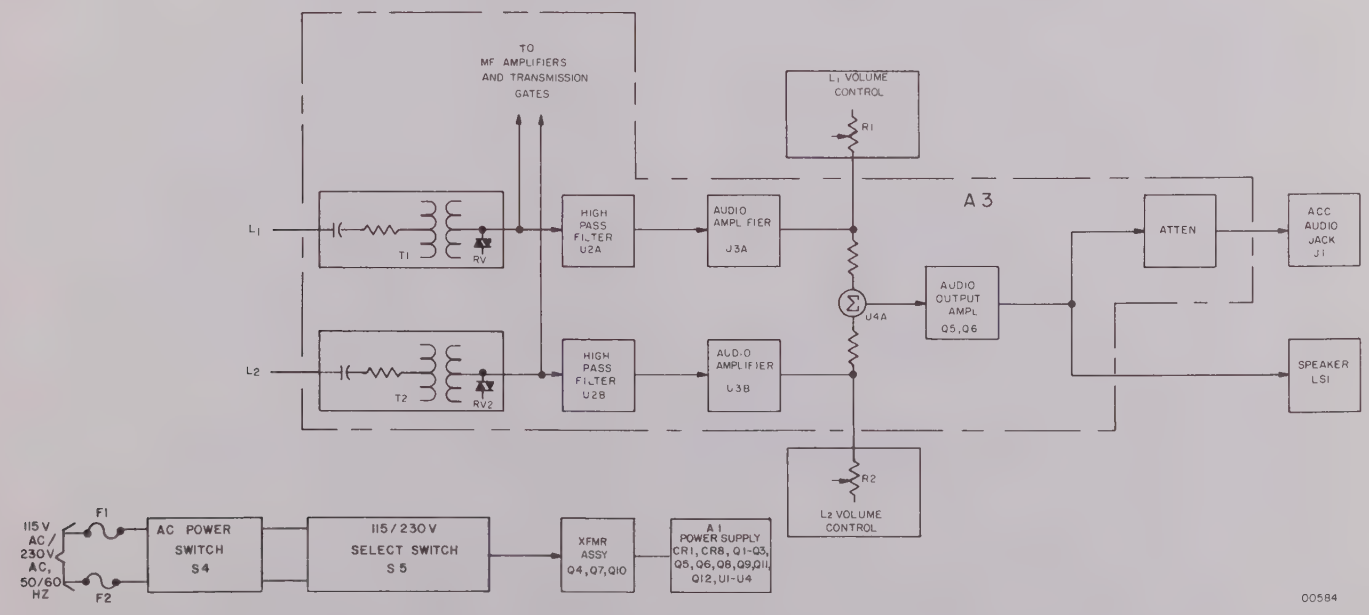


Figure 4—1. Model 2762 Audio Processing and Power Supply Block Diagram.

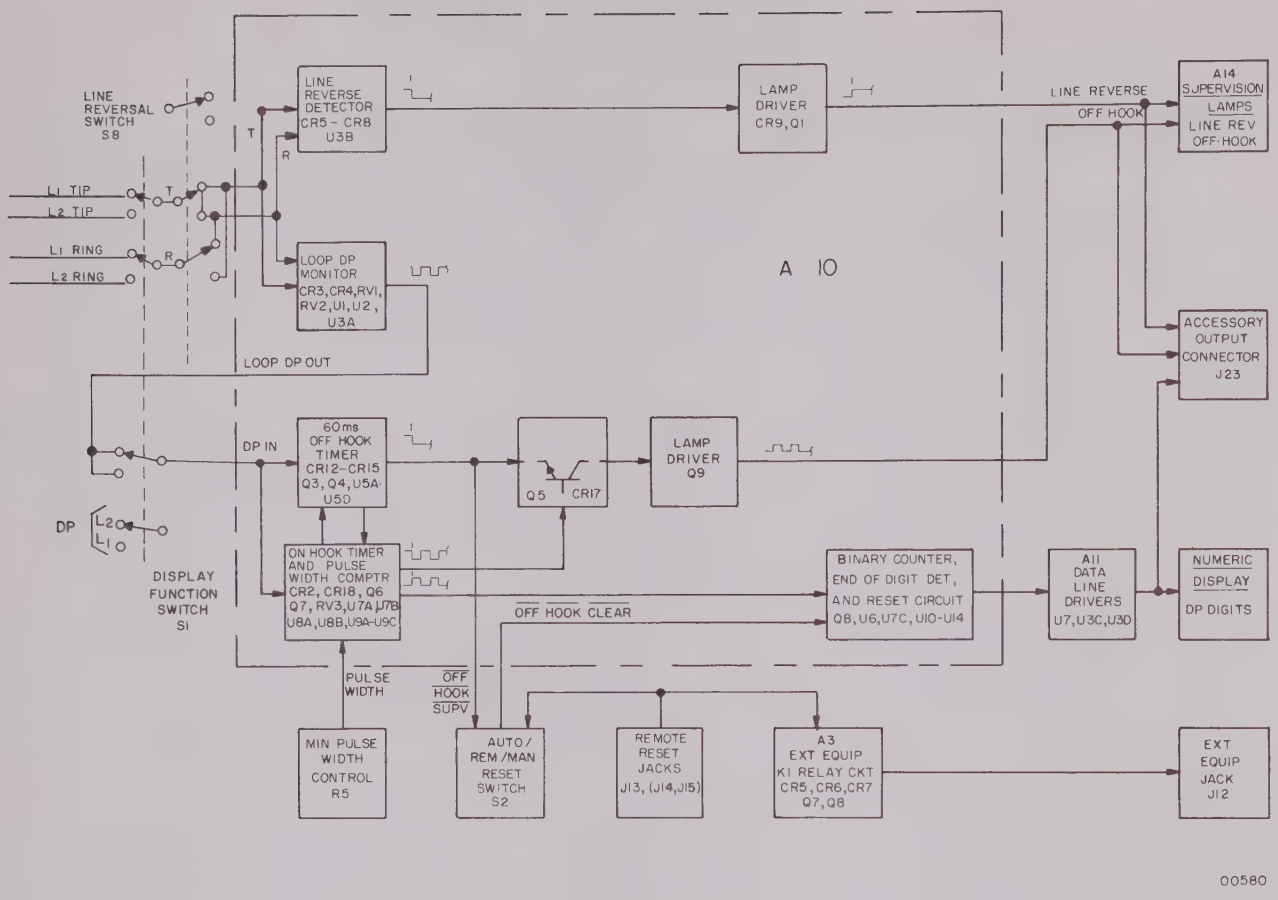


Figure 4—2. Model 2762 Loop Dial Pulse Signal Processing Block Diagram.

routed via the DISPLAY FUNCTION switch to the 60 millisecond off-hook timer, on-hook timer, and the pulse-width comparator.

4.11 The signaling is now analyzed by the 60 millisecond off-hook timer and the pulse width comparator. The output of the off-hook timer performs three functions: enables Q5 to extinguish the OFF HOOK supervision lamp; initiates a system reset pulse via the RESET switch S2 (AUTO position); and gates U9, allowing dial pulse information to reach the binary counter. The pulse-width comparator and the on-hook timer measure the on-hook interval of the input pulses, comparing them to the electrical conditions set by MIN PULSE WIDTH control R5.

4.12 At this point, the signaling is either rejected or accepted for further processing. If the signaling is accepted by the comparator, two outputs are generated One output provides a reverse bias to the base of Q5 coincident with the on-hook portion of the signaling. This enables the lamp driver to light the OFF HOOK lamp during the on-hook time of the signaling.

4.13 The second output of the comparator drives the binary counter and end-of-digit detector. The binary counter produces a BCD output that is timed by an end-of-digit detector. If 260 milliseconds have elapsed since the last on-hook signal, the end-of-digit detector will simultaneously generate a data present pulse to gate the BCD information to the line drivers

4.14 All commands from the reset circuit and the BCD information are routed to numeric display and ACCESSORY OUTPUT connector J23 via the data line drivers.

4.15 The reset cycle can be triggered three ways: by a 60 millisecond off-hook condition on the line that follows on-hook condition greater than 210 milliseconds; a remote reset input; or a manual switch operation. All three methods of reset are selected by

AUTO/REM/MAN switch S2. A reset pulse generated by any one of the methods mentioned above will clear the numeric display.

4.16 **E&M DP SIGNAL PROCESSING.**

4.17 To monitor E or M dial pulse signaling for numeric display, (Figure 4—3), the DISPLAY FUNCTION switch is set to either DP E or DP M. In this mode of operation the DISPLAY FUNCTION switch routes the desired E or M signaling from its associated buffer and inverter outputs on A10 to the 60 millisecond off-hook timer, the on-hook timer, and the pulse-width comparator.

4.18 E or M dial pulsing is received directly from E&M jacks J8 and J9 by the high-impedance input of the level detector. The level detector senses ground on the E lead and central office battery on the M lead.

4.19 If E dial pulse signaling is monitored, a train of negative-going pulses will appear at the E output of the level detector. This output is routed to supervision lamp board A14 via an inverter and lamp driver on A11. It is also routed to the DISPLAY FUNCTION switch via a buffer and inverter on A10.

4.20 When M dial pulse signaling is monitored, a train of positive-going pulses appears at the M output of the level detector. This output is routed to supervision lamp board A14 via a lamp driver on A11. It is also routed to the DISPLAY FUNCTION switch via a buffer stage on A10. The DISPLAY FUNCTION switch selects the desired E or M signal to appear at the input of the 60 millisecond off-hook timer, on-hook timer, and pulse-width comparator.

4.21 The signaling is now processed the same way as loop dial pulse signaling described in paragraphs 4.11 through 4.15.

4.22 **MF SIGNALING WITH LOOP SUPERVISION AND CAMA LOOP DP-MF SEQUENCES. (OPTIONS 0—3 ONLY).**

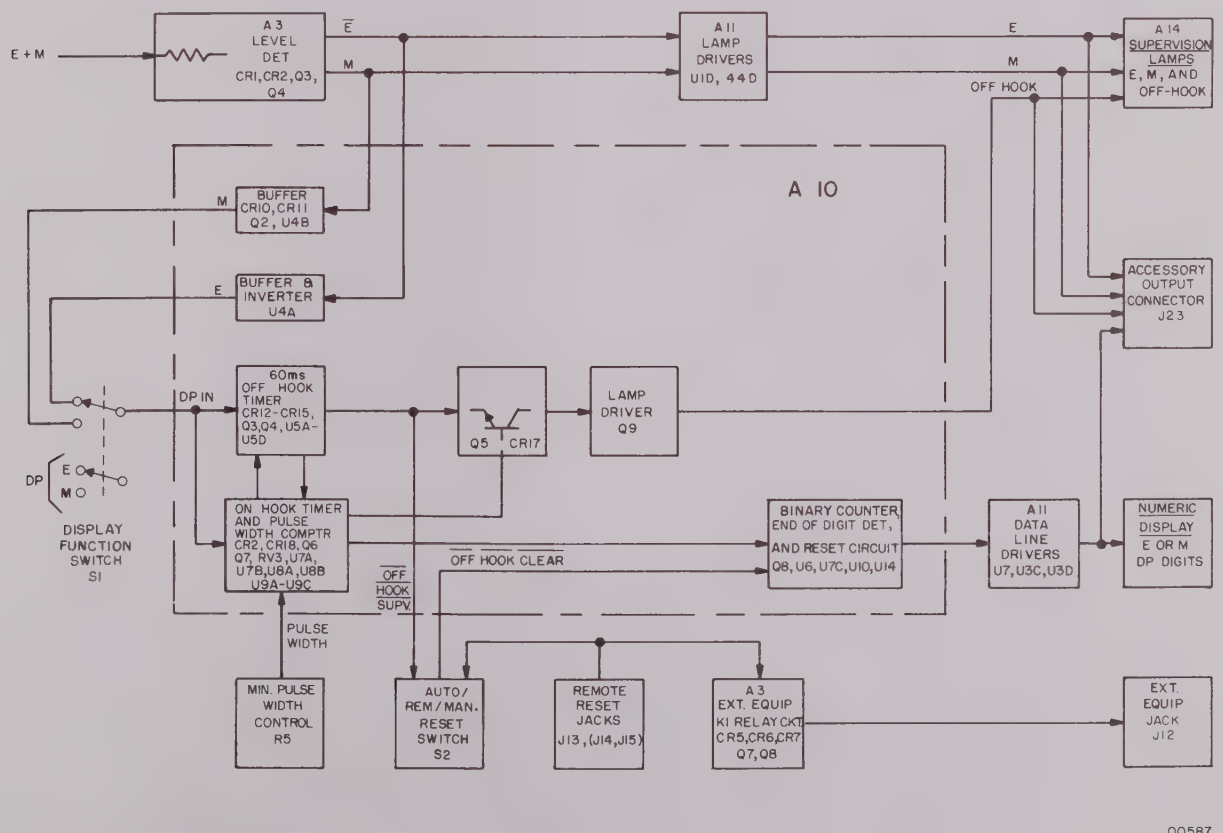

E+M
A3 LEVEL DET CR1,CR2,Q3, Q4
Ē
M
A11 LAMP DRIVERS U1D, 44D
E
M
OFF HOOK
A14 SUPERVISION LAMPS E, M, AND OFF-HOOK
A 10
BUFFER CR10, CR11 Q2, U4B
BUFFER & INVERTER U4A
ACCESSORY OUTPUT CONNECTOR J23
60ms OFF HOOK TIMER CR12-CR15, Q3,Q4, U5A-U5D
DP IN
Q5
CR17
LAMP DRIVER Q9
DP
E
M
DISPLAY FUNCTION SWITCH S1
ON HOOK TIMER AND PULSE WIDTH COMPTR CR2, CR18, Q6 Q7, RV3, U7A, U7B, U8A, U8B U9A-U9C
OFF HOOK SUPV
OFF HOOK CLEAR
BINARY COUNTER, END OF DIGIT DET, AND RESET CIRCUIT Q8, U6, U7C, U10, U14
A11 DATA LINE DRIVERS U7, U3C, U3D
NUMERIC DISPLAY E OR M DP DIGITS
PULSE WIDTH
MIN. PULSE WIDTH CONTROL R5
AUTO/ REM/MAN. RESET SWITCH S2
REMOTE RESET JACKS J13, (J14, J15)
A3 EXT. EQUIP KI RELAY CKT. CR5, CR6, CR7 Q7, Q8
EXT. EQUIP JACK J12
00587

Figure 4—3. Model 2762 E and M Dial Pulse Signal Processing Block Diagram.

4.23 In this mode of operation (Figure 4—4), DISPLAY FUNCTION switch S1 provides a signal path from the loop DP monitor output to the 60 millisecond off-hook timer and pulse-width comparator on A10 while CAMA FUNCTION switch S6 (options 0-3 only) provides the control bias voltage for the MF-FET transmission gate on A3.

4.24 Any MF tones present on L1 or L2 are passed through a high-pass filter on A2 to both automatic and manual gain control circuits (A2 and A3). Minimum threshold for manual operations is provided by MIN REC LEVEL potentiometer R3. Choice of gain control is provided by AGC/MAN switch S3.

4.25 Six sets of bandpass filters with level detectors on A5 and A6 translate the MF tones to six-line, positive TTL logic (e.g., for the 700 Hz line, 5 Vdc = 700 Hz tone present, 0 Vdc = 700 Hz absent). This conversion is the end of MF analog processing.

4.26 Digital processing commences with the six lines of frequency logic being simultaneously presented to MF Decoder A8, the frequency lamp drivers on A7, and the error detector on A7.

4.27 Decoder A8 translates the six-line frequency logic to digits or codes and the digital information is passed in BCD format to register A9. The codes are stored in latches on A11 and displayed via lamps on A13 after a strobe pulse from register A9. The decoder also generates a clock pulse ($\overline{CLK}$) when any frequency combination is a proper two-and-only-two-of-six condition. The $\overline{CLK}$ pulse is passed to register A9 for signal timing and to the error detector circuitry on A7 as a no error indication.

4.28 The frequency lamp drivers on A7 activate the lamps on A15 either for the duration of an input tone or, upon an error indication from the error detector circuitry, until reset.

4.29 The error detector, when enabled by ERROR FUNCTION control switch S7, times any MF frequency. If a $\overline{CLK}$ pulse (signifying proper 2/6 MF) is not generated on decoder A8 four milliseconds after the

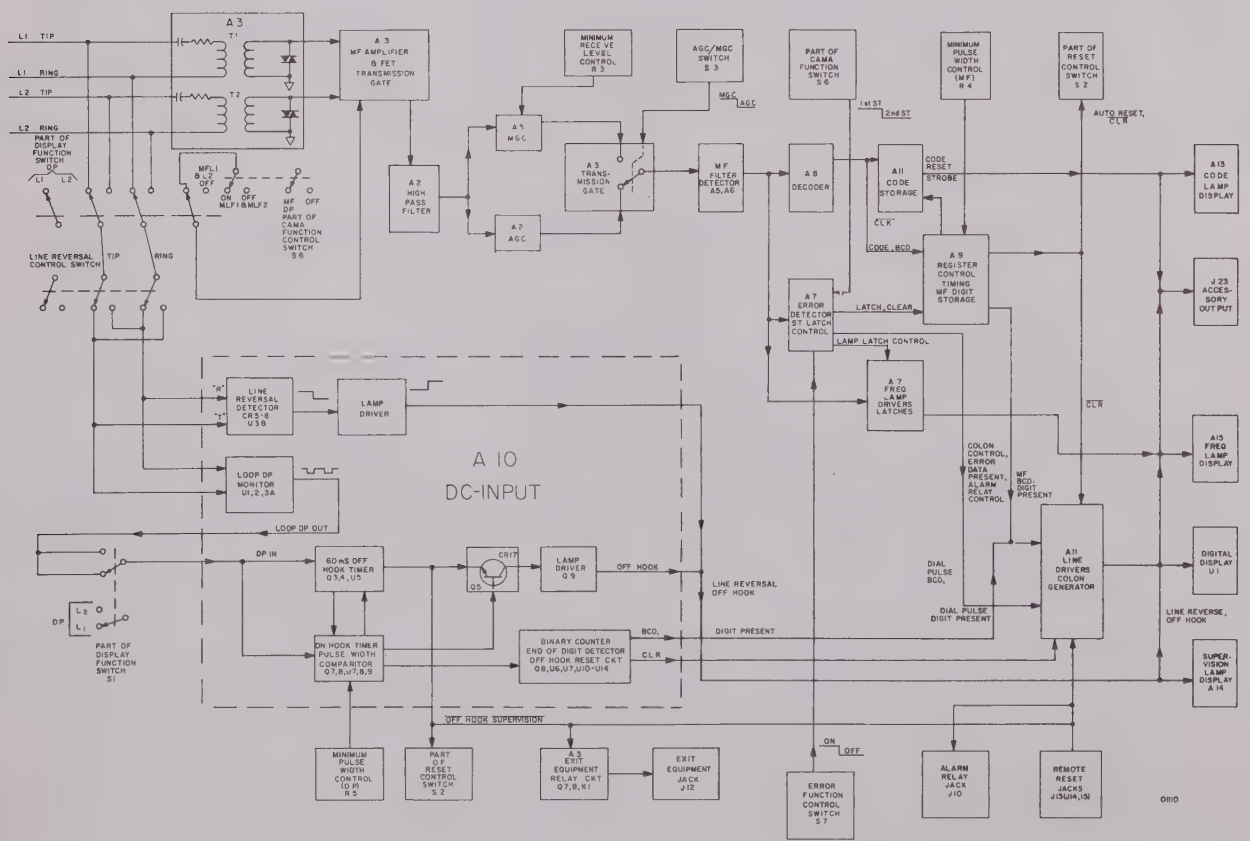

A 10
DC-INPUT
A 3
MF AMPLIFIER & FET TRANSMISSION GATE
A 2 HIGH PASS FILTER
A 5 AGC
A 6 AGC
A 3 TRANSMISSION GATE
MF FILTER DETECTOR A5,A6
A 8 DECODER
A 11 CODE STORAGE
A 9 REGISTER CONTROL TIMING MF DIGIT STORAGE
A 7 ERROR DETECTOR ST LATCH CONTROL
A 7 FREQ LAMP DRIVERS LATCHES
A 11 LINE DRIVERS COLON GENERATOR
A 13 CODE LAMP DISPLAY
A 15 FREQ LAMP DISPLAY
J 23 ACCESSORY OUT PUT
DIGITAL DISPLAY U1
SUPERVISION LAMP DISPLAY A 14
LINE REVERSAL DETECTOR CR5-8 U38
LAMP DRIVER
LOOP DP MONITOR U1,2,3A
60 mS OFF HOOK TIMER Q3,4, U5
ON HOOK TIMER PULSE WIDTH COMPARITOR Q7,8,U7,8,9
BINARY COUNTER END OF DIGIT DETECTOR OFF HOOK RESET CKT Q8,U6,U7,J10-U14
LAMP DRIVER Q9
MINIMUM RECEIVE LEVEL CONTROL R3
AGC/MGC SWITCH S3
PART OF CAMA FUNCTION SWITCH S6
MINIMUM PULSE WIDTH CONTROL (MF) R4
PART OF RESET CONTROL SWITCH S2
MINIMUM PULSE WIDTH CONTROL (DP) R5
PART OF RESET CONTROL SWITCH S2
A3 EXIT EQUIPMENT RELAY CKT Q7,8, K1
EXIT EQUIPMENT JACK J12
ERROR FUNCTION CONTROL SWITCH S7
ALARM RELAY JACK J10
REMOTE RESET JACKS J13(14),15
L1 TIP
L1 RING
L2 TIP
L2 RING
PART OF DISPLAY FUNCTION SWITCH S1
LINE REVERSAL CONTROL SWITCH
MF OFF DP PART OF CAMA FUNCTION CONTROL SWITCH S6
LOOP DP OUT
DP IN
OFF HOOK SUPERVISION
LINE REVERSAL OFF HOOK
DIGIT PRESENT
BCD.
CLR
CODE, BCD
LATCH, CLEAR
LAMP LATCH CONTROL
COLON CONTROL, ERROR DATA PRESENT, ALARM RELAY CONTROL
MF BCD. DIGIT PRESENT
DIAL PULSE BCD.
DIAL PULSE DIGIT PRESENT
LINE REVERSE, OFF HOOK
AUTO RESET, CLR
CODE RESET STROBE
1st ST
2nd ST
MGC
AGC
ON
OFF
0110

Figure 4—4. Model 2762 MF Signal Processing with Loop Supervision Block Diagram.

start of the digital signal, an error data present pulse is generated. This freezes all frequency lamps on at the time of error until reset: signals the colon generator on A11 to print a colon (:) on digital display U1 and activates the error alarm circuit on A11. Average filter and instrument delays (approximately 8 milliseconds) and the error integrity check interval (approximately 4 milliseconds prescribe the minimum error pulse width of the instrument (approximately 12 milliseconds).

4.30 A7 includes an ST latch circuit. Normally after reception of an ST signal, subsequent MF digits are ignored by the digital display until reset. When CAMA FUNCTION switch S6 is in the MF-MF position, the ST latch circuit does not inhibit digital signals until two ST signals have been observed. This allows both portions of a CAMA MF-MF sequence to be simultaneously displayed.

4.31 Register A9 compares the length of all $\overline{CLK}$ pulses from the decoder to the setting of MIN PULSE WIDTH control R4. When the CLK pulse width exceeds the setting of R4, a lamp strobe activates the lamps for any codes stored on A11. Also generated is a digit present pulse, which gates BCD information stored on A9 (from Decoder A8), to digital display U1 where the digit is placed in the proper position.

4.32 Buffer A11 includes error alarm relay K1 that provides a dry contact closure rated at 250 Vac, 1 A to ALARM RELAY jack J10. The closure lasts from the time of error detection until reset and is suitable for lamps, buzzers and other alarm devices.

4.33 Buffer A11 also includes the colon generator and WIRE-OR circuitry for either MF or dial pulse control of BCD, clear, and digit present data. This information, along with error data pulses, is presented to digital display U1 and also, through separate drivers, to accessory connector J23.

4.34 The loop dial pulse signaling portion of an MF-DP sequence, or the off-hook and line reversal supervision used on certain two-wire trunks, is interpreted as described in paragraphs 4.7 through 4.15.

4.35 RESET switch S2 allows flexibility in display-clear sequences. The Model 2762 erases all digits, codes, error indications, and latches via a negative-going signal on any of the CLR network lines. The source of this signal can be: a manual reset of S2; a remote reset (with S2 in any position) via REMOTE RESET jacks J13-15 or accessory connector J23; automatic, with S2 in AUTO from a KP/KP1/KP2 pulse, on-hook/off-hook transition,

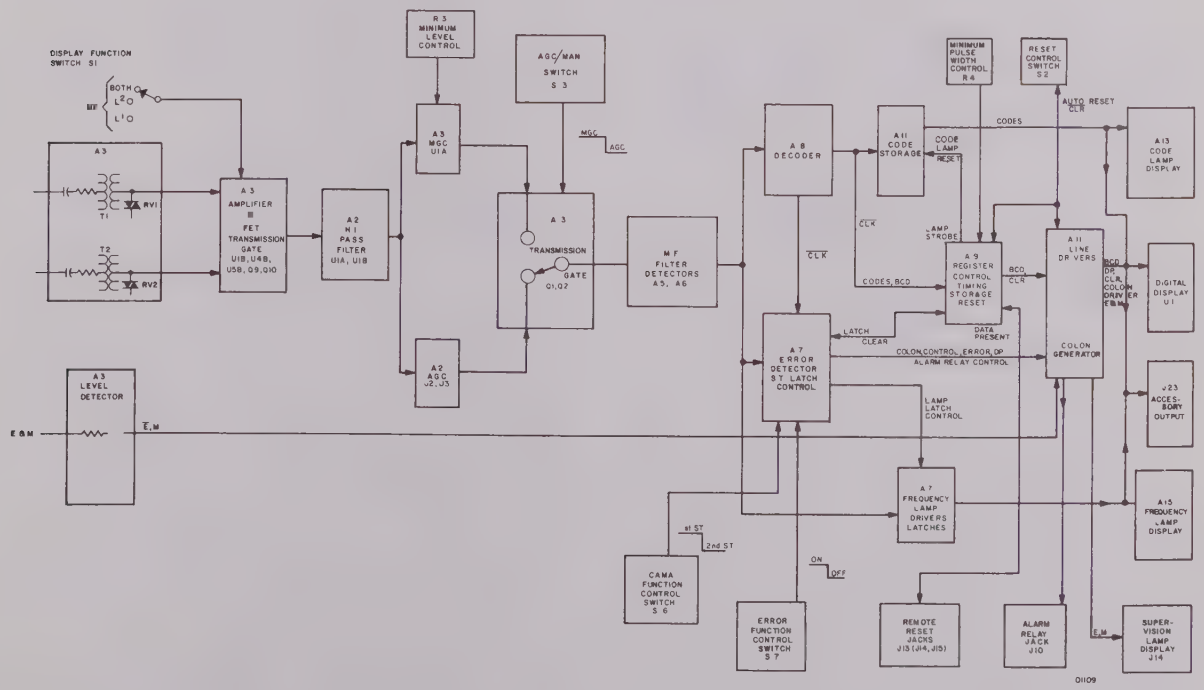


Figure 4—5. Model 2762 MF Signal Processing with E and M Supervision Block Diagram.

or (for Options 4 and 5) an SF (VF) seizure signal. EXTERNAL EQUIPMENT jack J12 can be used to reset auxiliary equipment after a remote or manual reset.

4.36 CAMA E or M DP-MF Sequences. The display of E or M dial pulse signaling, as described in paragraphs 4.16 through 4.21, is accomplished in an identical fashion in MF-E/M DP sequences. MF tones present on L1 are automatically applied to the MF decoding circuit and processed as described in paragraphs 4.24 through 4.33 and 4.35.

4.37 **MF SIGNAL PROCESSING WITH E&M SUPERVISON.**

4.38 Two-or four-wire MF transmissions are treated as described in paragraphs 4.24 through 4.33 and 4.35. DISPLAY FUNCTION switch S1 (Figure 4—5) gates L1 and/or L2 signals to the filtering and decoding circuits. E&M supervision is demonstrated by two lamps on Supervision Board A14, which are driven by two level detectors on A3. E&M supervision is accomplished by monitoring the E&M leads with two separate dc-coupled level-detector circuits. The detectors monitor the E lead for ground and the M lead for an open or central office battery. Their outputs (E,M) are routed to the lamp drivers on A11. The drivers extinguish the appropriate lamp(s) (E,M) on A14.

4.39 **MF SIGNAL PROCESSING WITH SF (VF) SUPERVISION (OPTIONS 4 AND 5).**

4.40 The Model 2762 with options 4 and 5, detects and displays 2400 Hz and 2600 Hz tones present on L1 and L2 via lamps on Supervision Board A14. In order to maintain SF (VF) channel identification, dual high-pass filters and AGC circuits are required (Figure 4—6). SF Detector board A4 contains four required filters, level detectors, and lamp drivers. The outputs of the high-pass filters on A2 are summed and routed to a manual gain control circuit on A3. The outputs of the dual AGC circuits are summed on A3 and connected to the transmission gate on A3. All other aspects of processing are identical to paragraphs 4.24 through 4.33 and 4.35.

4.41 **DETAILED CIRCUIT DESCRIPTION.**

4.42 Paragraphs 4.43 through 4.117 provide the detailed circuit description of boards A2 through A17. All descriptions are in reference to their respective schematic diagrams located in Section 7 of this manual.

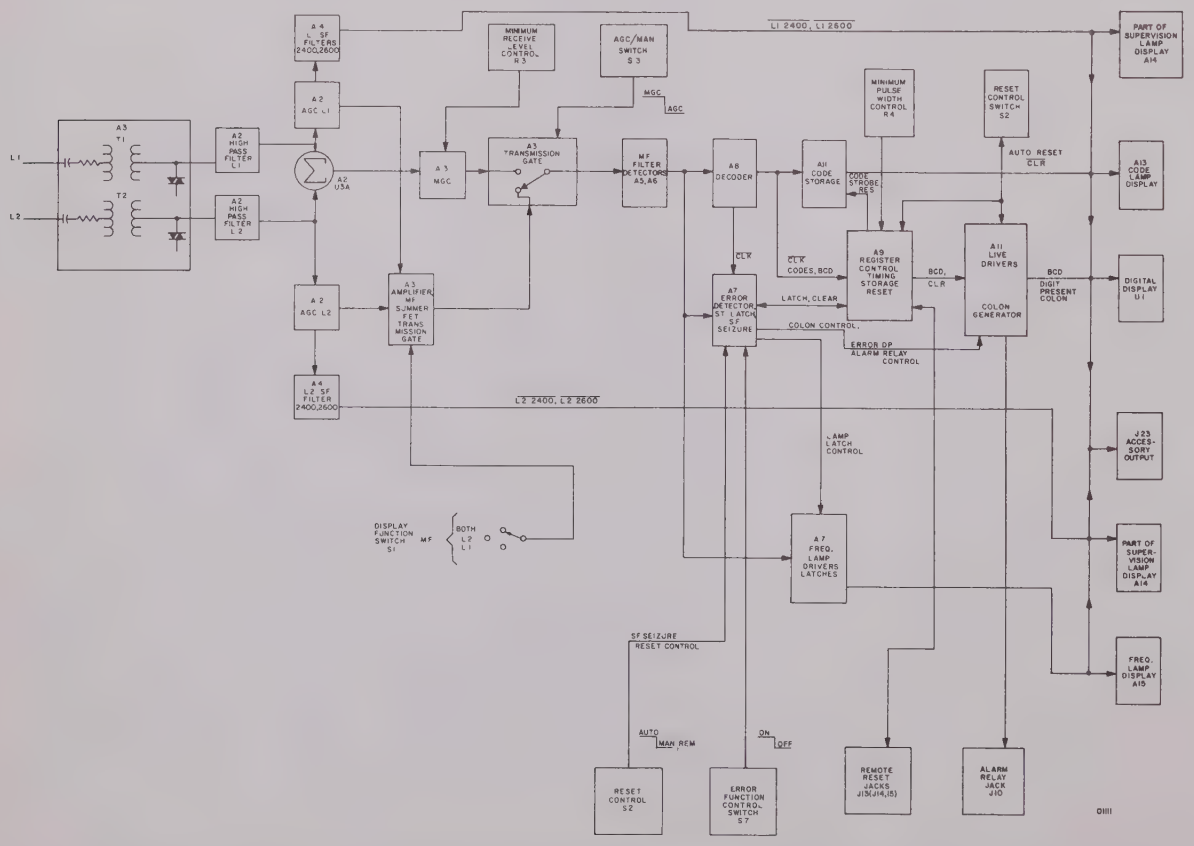


Figure 4—6. Model 2762 MF Signal Processing with SF (VF) Supervision Block Diagram.

4.43 A better understanding of the circuit functions in relation to the whole unit can be obtained by cross-reference to the overall schematic diagram in Section 7 and the block diagrams discussed in the preceding text of this section.

4.44 MF INPUT AGC A2.

4.45 The functions of the AGC board are two-fold: to subject input signals to a high-pass filter and to provide a relatively stable output level for the bandpass filters on A4,A5, and A6 for any input level within a 30 dB dynamic range.

4.46 Refer to schematic diagram Figure 7—3. Integrated circuit U1 provides a four-pole active high-pass filter with an in-band gain of approximately 0 dB for suppression of power line interference and its harmonics. The cutoff frequency is approximately 380 Hz.

4.47 The output of the high-pass filter is routed to a manual gain control (MGC), on A3, and to the AGC on A2. Choice of MGC or AGC is made by means of front panel MAN/AGC switch S3, which controls a transmission gate on A3.

4.48 The AGC circuit maintains nearly constant output amplitude over approximately 30 dB of input signal variation. This provides the filters and detectors on A5 and A6 with a nearly constant input required to maintain their characteristics over the full dynamic range of the unit.

4.49 AGC is achieved by varying the feedback path around U2A with the drain-source resistance of Q1. With no signal present, Q1 is turned on through R16. Its low drain-source resistance and R14 form an attenuator that reduces any ac feedback at pin 2 of U2A by approximately 30 dB. Any signal received is amplified at full gain and coupled through C8 to two of the four inputs of U3. If the signal peaks exceed the offset voltages set up by divider chain R21, R23, R25, R27 and R28, the normally-off sections of the two differential amplifiers in U3 will conduct; one on the positive peak and one on the negative peak. Since both conduct through R18, a greatly amplified full-wave, negative-going signal appears across R18. The gate of Q1 is rapidly pulled negative, thus increasing the channel resistance and decreasing the gain of the stage.

4.50 The circuit reaches a steady state within two or three cycles of signal at an output level such that the amplified peaks just exceed the offset voltages set by the divider. The circuit returns to its original state over a much longer time (hundreds of milliseconds) controlled by R16 and C7.

4.51 A normally-open FET switch is used to block idle line transients and initial surges caused by high-level signals from U2A. The incoming signal amplitude must be sufficient to drive the gate voltage of Q1 more negative than an adjustable reference voltage set by R33 before the switch will close. Resistors R31 and R32 provide a slight positive feedback around comparator U2B to prevent switch chatter. Thus, in addition to blocking initial transients, the circuit establishes a fairly precise threshold level below which signals will not be processed.

4.52 DUAL AGC A2 (OPTIONS 4 AND 5 ONLY).

4.53 The AGC card used in options 4 and 5 of the Model 2762 includes two circuits identical to that described in paragraphs 4.44 through 4.51. The need for a double AGC is dictated by the requirement to monitor SF (VF) Frequencies on both input channels simultaneously and distinguish, by LED operation, which frequency or frequencies are present on which channel. The four SF filters depend on relatively stable input levels to maintain the required narrow bandwidth. Summing amplifier U3A is included to route the high-pass filter outputs to the manual gain control on A3 and subsequent MF detection and decoding.

4.54 MF AND SF (VF) DETECTORS A4,A5, AND A6.

4.55 The amplified MF signal from A3 (MF OUT) has a level of approximately —27 dBm. It is routed to six parallel-connected MF passband filters/detectors located on A5 and A6. The outputs from dual AGC board A2 of options 4 and 5 also have a level of approximately —27 dBm and are connected to the two pairs of SF (VF) passband filters/detectors located on A4. All ten filters have a similar construction as shown on Figures 7—6 and 7—7. U1, U3 and U5 (and U7 on A4) compose pass-band filters while U2, U4 and U6 (and U8 on A4) are level detectors. The final stage of each detector is two (one per A4 detector) level-shifting transistors.

4.56 Consider the circuit consisting of U1 and U2 (A5 and A6). The resonant frequency of each section of the filter (U1A, U1B), connected by a strap from pin 5 to pin E, is determined by the Wien-type network associated with it. For U1A, the network is R5, R6, R7, C2 and C3. The Q of this section is controlled by feedback network R2, R3, and R4. The fraction of the filter output routed to threshold detector U2, and thus the input level at which the detector will switch, is set by R15. The detector circuit is basically a feedback full-wave bridge consisting of U2A, CR1, CR2, C7, C8, R16, R17 and C6 with a fixed dc offset established by R21 and R18. When the average value of the full-wave rectified signal exceeds the offset voltage, the output of U2B goes from low to high and drives Q1 on.

4.57 The four output transistors of A4 directly drive LEDs on A14 and are also connected to the SF seizure signal detector on A7 (options 4 and 5). A second transistor stage on each detector output of A5 and A6 inverts the signal polarity and allows for direct interface with the TTL circuits on Decoder A8 and Error Detector A7.

4.58 **MAIN INPUT A3.**

4.59 The main input board provides the following:

a. Two high-impedance, dc-blocked inputs for line 1 and line 2.

b. Circuitry for MF channel selection.

c. Speaker driver and volume controls (along with front panel controls) for L1 and L2.

d. High input-impedance level detectors for the E&M inputs.

e. Manual gain control circuitry for MF signals.

f. External equipment reset feature.

4.60 As shown on schematic diagram Figure 7—5, T1, R28, C11, and T2, R20, C12 provide two independent, high-impedance, dc-blocked input channels for bridging and monitoring MF signaling or audio range sound reproductions via speaker and AUDIO ACC jack J11. Varistors RV1 and RV2 provide transient protection in the transformer secondaries.

4.61 U1B and U4B provide MF signal isolation between input channels L1 and L2. According to the position of DISPLAY FUNCTION switch S1, transmission gate Q9 and Q10 switches through to U5B signals from either or both input channels. U5B and R51 provide for 0 dB gain from front panel input jacks to test point TP3.

4.62 Signals from the L1 and L2 inputs are also routed through separate high-pass filters to identical audio amplifiers, attenuated by L1 and L2 VOLUME controls R1 and R2, summed, and amplified again by the audio output amplifier. The combined audio is applied to the speaker and to AUDIO ACC jack J11.

4.63 The E&M inputs provide high-impedance level detectors to monitor and interpret E&M (drop and line) conditions. The E level detector reflects an on-hook condition for an input voltage more negative than approximately —9.9 Vdc, or when the input is open. When a ground or a dc voltage more positive than —9.9V is applied to the input, Q3 switches on. The output lead disables the driver on A11 for the E lamp. The instrument defines this input as an E off-hook condition. If DISPLAY FUNCTION switch S1 is in the E DP position, the E level detector output is also connected to T-R/E/M DC input on A10 for off-hook lamp operation and dial pulse counting, timing, and display.

4.64 The M level detector reflects an on-hook condition for input voltages more positive than approximately —22.6 Vdc, or when the input is open. When central office battery or a dc voltage more negative than approximately 23 Vdc is applied to the input, Q4 switches off; the output lead disables the driver on A11 for the M lamp. The instrument defines the input as an M off-hook condition. If DISPLAY FUNCTION switch S1 is in the M DP position, the M level detector output is also connected to T-R/E/M DC input A10 for off-hook lamp operation and dial pulse counting, timing, and display. The E lead corresponds to drop and is connected to both J8 tip and J9 tip. The M lead corresponds to line and is connected both to J8 ring and J9 ring.

4.65 The MF input signals to L1 and L2 pass from A3 through pin C to the high-pass filters on A2. After being filtered, the signal appears at the input of the AGC and, via pin 6 (MF HP Out) on A2 to the input of the manual gain amplifier on A3. Both the AGC and the manual gain control circuit outputs are routed to transmission gate FETs Q1 and Q2 for selection.

4.66 If MAN/AGC switch S3 is in the AGC position, a +12 Vdc signal is applied to the gates of transmission gates Q1 and Q2. This switches the AGC output of A2 through to pin 5 (MF Out) on A3, and to the selective detectors. If the MAN/AGC switch is in the MAN position, a —12 Vdc signal is applied to the gates of transmission gates Q1 and Q2. This switches the manual gain control circuit output to pin 5 (MF Out) and to the MF detectors.

4.67 The manual gain control circuit employs current control of diode resistance in the input and feedback path of amplifier U1A. If the manual gain control input voltage is 0, both diodes CR3 and CR4 are reverse biased and the stage gain is unity. If the manual gain control input voltage goes positive, CR4 is reverse biased but CR3 conducts. The dynamic resistance of CR3 and resistor R4 form an attenuator that reduces the feedback signal to U1A-2 by up to 10 dB, thus increasing stage gain by up to 10 dB. If the manual gain control input voltage goes negative, CR3 is reverse biased but CR4 conducts, decreasing the input signal amplitude and stage gain by up to 10 dB.

4.68 The REMOTE RESET input is routed through a current-limiting circuit consisting of F1, R53, and CR10 and CR11. The purpose of the circuit is to protect the various TTL reset gates from voltages outside TTL levels via CR11 and CR12 while F1 limits the current to 125 milliamperes. This circuit and the manual contact of the RESET switch are directly routed to external equipment reset relay driver circuitry Q7 and Q8. This driver energizes K1 to provide an isolated contact closure to reset accessory equipment (e.g., the TN 76 or TTS 2776) whenever the Model 2762 receives a remote or manual reset command.

4.69 For the 2762 and 2762R, straps are added (A-B, C-D) to route the inputs from either channel directly to the MF summer and gate (U1B, U4B, U5B, Q9 and Q10) and subsequently to the AGC. In options 4 and 5, the strapping is changed to A-a, B-b, C-c and D-d. This change routes the two channel inputs directly to the special dual AGC of options 4 and 5 in order to maintain channel identification internally for the two sets of SF (VF) detectors. The dual AGC outputs are routed back to the summer and gate of A3 for MF operations.

4.70 **MF DECODER A8.**

4.71 The MF decoder scans the six outputs of the selective detectors on A5 and A6 and decodes these TTL signals to one of the five codes or ten digits recognized by the Model 2762.

4.72 Two and only two of six frequencies are required for an MF code or digit. When only one, or more than two frequencies are simultaneously present, then no logic output is generated by A8.

4.73 The outputs include negative logic forms of the MF codes: KP/KP1, ST, KP2/ST2P, CD11/ST3P, and CD12/STP. These outputs are directly routed to A11 to await a lamp strobe signal from A9 to enable lamp activation.

4.74 The MF digits are decoded directly into a BCD format and routed to A9 for gating to the numeric display after a timing check.

4.75 Other signal outputs include a positive logic KP, (KP1 for options 0 and 1. KP1 +KP2 for options 2,3,4, and 5), positive logic ST (ST + STP + ST2P + ST3P for options 0 and 1. ST for options 2,3,4, and 5) and a CD11 + CD12 to perform various functions on the register circuitry of A9.

4.76 The $\overline{\text{CLK}}$ output of A8 provides a logical zero signal for the duration of any legitimate MF code or digit. This pulse interval is compared on the register card to the setting of the MIN PULSE WIDTH control and, if shorter, is rejected.

4.77 **ERROR DETECTOR A7.**

4.78 Frequency lamp drivers U11A, U11B, and U11C and U12A, U12B and U12C accept various combinations of MF inputs from MF detectors A5 and A6 in the form of TTL signals and invert them to drive LEDs on frequency lamp board A15. The gates are open-collector to allow simultaneous lamp activation by U11D, U11E and U11F and U12D, U12E and U12F in case of error signals.

4.79 The error detector (U3, U5B, etc.) also monitors the MF inputs. If the error function control is high, any MF causes a four-millisecond waiting period at U3A. If a $\overline{\text{CLK}}$ pulse from decoder A8 does not appear for the entire one milisecond signal from U3B (which occurs after the waiting period), then an error signal is generated at TP6. The $\overline{\text{CLK}}$ pulse signifies 2 and only 2 out of 6 (correct) MF. U5B, if not latched by an ST via pin 13, generates complimentary 30-millisecond output pulses to drive numeric display U1 and the colon generator for every MF error. For the first error received after a CLR command, flip-flop U4A/U4B is set, driving an external alarm relay on A11 and triggering the six D flip-flops on U3, transferring the active MF inputs U11D, U11E, and U11F and U12D, U12E, and U12F. Thus those lamps on at the time of an error indication are held on until U13 is cleared via a CLR command. Errors subsequent to the first one after a CLR command cannot change the state of flip-flop U4A/U4B and thus do not latch additional lamps.

4.80 The single/double ST latch circuit (U10, etc.) responds to the first or second ST signal and ST timing indication received at pins 12/N and 13/P after a CLR command (8/J). Counter U10 is set to zero by a CLR via U6D and counts either one or two ST inputs, depending on whether CAMA FUNCTION switch is not or is in the MF-MF position. Gates U7D and U4C prevent additional counts from reaching U10 and changing its state after an ST latch indication. U2B and U2C are open-collector outputs driving output M and latching U5B to prevent error talkup, which might occur from speech-induced filter transients.

4.81 The SF (VF) seizure detector (U8, U9, etc.) presents outputs at TP5 and pin B only under the following conditions, which constitute seizure in CCITT # 5 systems:

a. Logic 1 at 4 and D (send 2400, receive 2600).

b. Logic 0 at 9 and 7/H (no send 2600, no receive 2400).

c. Duration of 100 milliseconds.

4.82 A logic one at TP4 triggers one-shot U8 causing that package to generate a 90-millisecond pulse to J-K

flip-flop U9. At the end of the pulse, the Q output of U9 causes U8B to generate 30-millisecond signals at the Q and $\overline{Q}$ outputs. The negative pulse is passed from the board via pin B and the positive pulse gates U2D if the unit is in the AUTO RESET mode (K = 1) and generates a $\overline{CLR}$ command. If conditions for seizure listed above do not last for 90-milliseconds, then the output of U8 is cancelled. The resulting negative transition at U9—12 does not clock U9 since the clear command effected at pin 2 by the change in state at TP4 overrides the $\overline{CLK}$ input and the entire sequence of 90-milliseconds with proper input logic conditions must be begun again before an SF (VF) seizure condition may be recognized.

4.83 **MF REGISTER A9.**

4.84 The functions of the register card are limited to MF operations and include: timing of input data pulse widths compared to the setting of the MIN PULSE WIDTH control R4; KP reset command detection and conversion; temporary storage of digital data in BCD format; and data present pulse generators for the digital and code lamp displays.

4.85 Presence of proper MF is signified by the $\overline{CLK}$ pulse from Decoder A8, that can be observed at TP1 on Register A9. Transistor Q1 is cut off for the duration of the $\overline{CLK}$ pulse allowing capacitors C1 and C2 to charge toward +12 Vdc. If the interval is long enough to allow the current through MIN PULSE WIDTH control R4 to charge C1 and C2 to the turn-on level of Q2, then a positive-going pulse will be present at TP3. This triggers U3, which generates a 10-microsecond, positive-going data present pulse that can be observed at TP4. This data present pulse performs four functions: triggers the single/double ST counter on Error Detector A7 if an ST signal is also present; enables one input of KP reset gate U1B; enables digit present gate U6C if a code is not indicated via U5; and, with its trailing edge, triggers U2B, the lamp strobe for the code lamps.

4.86 If RESET switch S2 is in the AUTO position, Q3 is turned on via pin 9K and the KP reset gate at U1B-3 is high. If a KP pulse is indicated via pin 4 and a data present pulse occurs at pin 5 simulatenously, then a KP reset pulse occurs. This signal resets registers U8 and U9 via U4F and also the code lamps via U4E and U4C which increase the fanout of U4F. The KP reset pulse also triggers U7B, which drives the CLEAR line low for about 27 milliseconds via open-collector gate U6B. The CLEAR line clears the digital display via Buffer A11, and resets both the single/double ST counter and the error function circuits on Error Detector A7.

4.87 A remote, manual, SF seizure (options 4 and 5), or off-hook generated clear will trigger U2A on the register, extinguishing the code lamps. The one-shot output duration of U2A is about 3 microseconds in order to be finished before the end of the data present pulse of TP4. This prevents the KP lamp from being erased after the lamp strobe pulse from U3 has occured. If the source of a reset were a KP1 or KP2/ST2P pulse, then that signal would also erase its own lamp if the one-shot pulse of U2A were too long.

4.88 U5 inhibits the digital display under two circumstances: presence of a code or presence of an ST latch signal from Error Detector A7 via U4D. The only condition under which U6C will gate a data present pulse is a high output from U5. The only conditions under which the output of U5 is high are: no code present; no ST latch signal present; and the presence of a $\overline{CLK}$ pulse from Decoder A8.

4.89 When a digit present pulse is generated by U6C, three events occur: a digit present pulse is routed to the display via U6A and Buffer A11; digital information in BCD format from Decoder A8, present at the iputs of D flip-flops U8 and U9, is clocked to the Q outputs; and these outputs are gated to the digital display via U10 and Buffer A11 for 27 milliseconds as determined by one-shot U7A.

4.90 **T-R/E/M DC INPUT A10.**

4.91 The functions of the DC input card include: detection for display of loop supervision conditions; detection for display of line polarity (LINE REV); timing circuits for on-hook, off-hook, and inter-digit intervals; pulse-width comparison to external control; dial-pulse counting; and, for the numeric display, BCD, reset, and data present pulse command generators.

4.92 Loop Dial Pulse Observations. When the DISPLAY FUNCTION switch is in the DP L1 or DP L2 positions, the proper input is connected directly to the TIP and RING pins (2 and 4/D) of A10 as well as the audio amplifier on A3. U1A and U2A are level detectors whose outputs are negative when their respective inputs are more negative than approximately −3 Vdc (Internally adjustable to −0.6 to −5.1 Vdc). U1B and U2B invert those input signals that have durations longer than approximately 4 milliseconds. The AND gate formed by CR3, CR4, R7, R9, and U3A produces high outputs (off-hook) when both tip and ring inputs are negative.

4.93 Line Reversal Detector. U3B is a diode-protected, pre-biased level detector whose output remains high for no input or for tip voltage levels more negative than ring voltage levels. When a line is reversed (V_{tip} more positive than V_{ring}), U3B inhibits lamp driver Q1, extinguishing the LINE REV lamp.

4.94 E&M DP Observations. The E&M level detector on A3 is directly connected to lamp and relay drivers on A11, to the E input (pin 7/H) and to the M input (pin 8/J) of A10. The E signal is inverted by integrator U4A for those transients lasting longer than approximately one millisecond. The M signal is inverted by Q2 and again by integrator U4B if the transition is longer than one millisecond. The E and M outputs are both high (+5 Vdc) for off-hook conditions and low (−5 Vdc) for on-hook.

4.95 Dial Pulse Input. Dial pulse input lead pin 11/M is connected to the E, M, or loop DP outputs on A10, depending on the position of the DISPLAY FUNCTION switch. This input is routed to three parallel circuits: an off-hook timer; an on-hook timer; and a two-transistor gate that converts the DP input signals from ± 5 Vdc to TTL levels (+5 Vdc and ground) for comparison with the pulse-width comparator output.

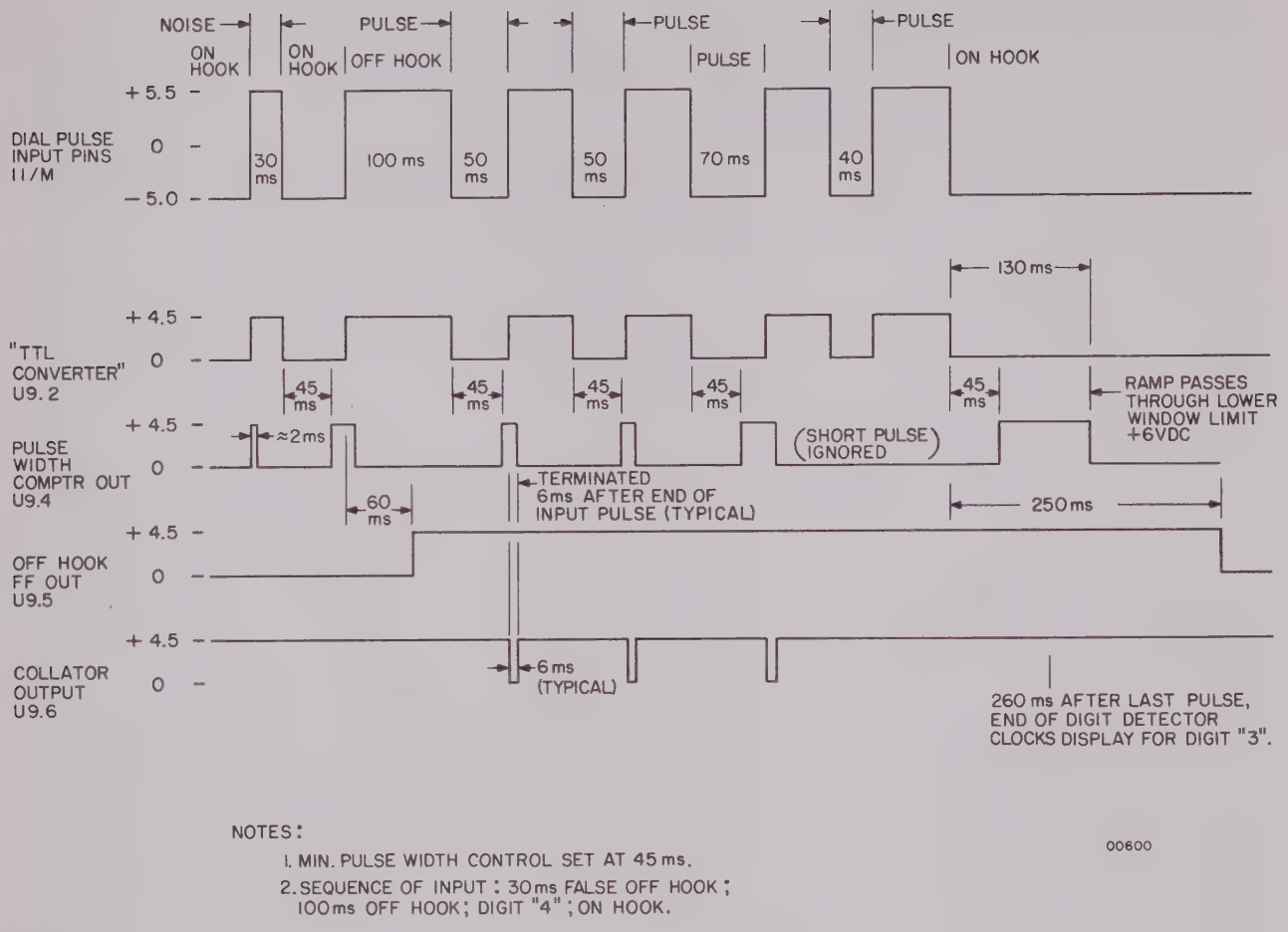
4.96 Off-Hook Timer. The dial pulse input waveforms approximate rectangular pulses switching from approximately +5 Vdc to −5 Vdc. The positive voltage represents off-hook and the negative on-hook conditions. Differential amplifier U5D and U5C ignores any high (off-hook) signal from the dial pulse input whose duration is less than approximately 60 milliseconds. A high input on U5D-12 enables a charge path through U5 to C5, charging that capacitor toward +12 Vdc. If the high input signal is longer than 60 milliseconds, the voltage at pin 14 ramps down to approximately 0.9 Vdc forward biasing CR12 and setting a flip-flop. This RS flip-flop, composed of Schmitt trigger U5A and output Q4, switches one input of discrete nand gate U5B, Q5, Q9, which indirectly drives the OFF-HOOK lamp. Forward biasing of CR12 causes the differential amplifier output (U5A, pins 1 and 5) to change state. The collector current from U5A-5 creates a voltage drop across R32 and forward biases Q4. Also, C6 is charged to approximately +3 Vdc through R31 to maintain a constant output at Q4 until the on-hook timer resets the flip-flop via CR16.

4.97 On Hook Timer. Differential amplifier U7A presents an output that is compared to an external on-hook interval timing control through U8. This output is also the off-hook flip-flop reset signal, if the on-hook (low) duration of the DP input signal exceeds approximately 210 milliseconds. The low-to-high off-hook transition of the DP input causes a current flow through pin 1, creating a drop across R43 and switching on Q6. Capacitor C10 imparts a small (approximately 6-millisecond)transitional delay to compensate for the slew rates of U8A and U8B. Capacitor C11 is quickly discharged through R45. A high-to-low on-hook transition reverses the operation except that the rate at which C11 is charged is much slower. If the low on-hook signal lasts longer than approximately 210 milliseconds, the output voltage is allowed to ramp downward toward a level that will reset off-hook flip-flop U5A and Q4, disabling nand gate U5B, Q5, and Q9.

4.98 Pulse Width Comparator. U8A and U8B comprise a level detector that compares the ramp output voltage of the on-hook timer to preset voltage levels (window) for passage, or rejection, of a given pulse. The window is formed by one input (U8B-6) preset to +6 Vdc and one input (U8B-3) than can be set within a range of +7.4 Vdc to +11.2 Vdc by the MIN PULSE WIDTH control (100 milliseconds to 18 milliseconds, respectively).

4.99 For example: If the MIN PULSE WIDTH control is set at 65 milliseconds, a level of approximately +8.9 Vdc appears at U8A-3. A voltage (+12 Vdc) will appear at U8-2 and U8-5 and begin to decay 6 milliseconds after reception of a low on-hook signal. The voltage decay will form a ramp which, if the on-hook signal duration is greater than 65 milliseconds, will reach the upper window limit of +8.9 Vdc, causing both outputs of U8 to go high. Test point TP1 will now be at a logic 1 level of approximately +4.5 Vdc. The ramp function will continue downward until the end of the on-hook signal or until a level of approximately +0.9 Vdc is reached, at which time the off-hook flip-flop will be reset as described above. If the ramp passes through the lower window limit of +6 Vdc, (in this case approximately 60 milliseconds after the upper limit was reached) the output of U8B will switch to a low level and terminate the logic 1 signal at TP1. Should an on-hook duration be less than the MIN PULSE WIDTH control setting, the ramp is never allowed to reach the upper limit of the window, and is reset to +12 Vdc.

4.100 Legitimate Dial Pulse Collation. U9 performs three functions: compares the dial pulse input signal (after conversion to TTL levels) with the pulse-width comparator U8 output at TP1, and the output of the off-hook flip-flop; passes legitimate pulses forward to the counter; and drives the second output of the off-hook NAND gate. The pulse-width comparator generates an output whenever the ramp output of U7A passes through the prescribed window. This includes initial on-hook/off-hook and final off-hook/on-hook transitions as well as pulses of legitimate length. Referring to Figure 4−7, the first on-hook/off-hook transition does not change the output of U9B because the off-hook status at the output of U5B continues to disable U9B for 60 milliseconds after the transition. The final off-hook/on-hook transition is ignored because TTL converter U7B and Q7 tracks the Dial Pulse Input, inhibiting U9B via pin 3.



NOTES:

1. MIN. PULSE WIDTH CONTROL SET AT 45 ms.
2. SEQUENCE OF INPUT: 30 ms FALSE OFF HOOK; 100 ms OFF HOOK; DIGIT "4"; ON HOOK.

00600

Figure 4—7. Model 2762 Dial Pulse Collator Timing Diagram.

4.101 Off Hook NAND Gate. The second function of U9 is to disable one input of NAND gate U5B, Q5, and U9 after occurence of legitimate length dial pulses. When CR17 is forward biased, Q5 is inhibited and Q9 enabled, causing the OFF-HOOK lamp to indicate an on-hook condition.

4.102 Clear Pulse Generator. Off-hook flip-flop U5A and Q4 enables U5B after an off-hook condition has been received and verified for proper length. The collector of U5B is connected to the input of U6A when the RESET switch is in the AUTO position. This negative transition signals U6A to generate a 30-millisecond pulse that is inverted by U7C and passed through gates on A7, A9, and A11, clearing the numeric and code lamp displays. U6A is, by specification, triggered only upon reception of a 60-millisecond off-hook signal that has been preceded by a 210-millisecond on-hook interval.

4.103 Dial Pulse Counting: Interdigital Timing and Control. U10 receives from U9C a train of pulses for each digit and provides the total at its BCD outputs. Transient protection for U10 is provided by several means: R60 and C14; gating of the end of digit input; and gating of BCD output U14. The first count releases the latch on the end-of-digit detector input via U11A and U13B. The leading edge of this or any subsequent pulse that represents the on-hook condition, eliminates the charge on C15. If the on-hook condition lasts longer than approximately 260 milliseconds, C15 will charge through R63 to a high enough level to trigger U13A of the end-of-digit detector. This is the timing that the end-of-digit detector uses to indicate that full count for the current digit has been received. The detector proceeds to initiate a chain of events. U13D is enabled and, through U12C, gates the BCD output through U14 to A11, from which the numeric display is directly driven. Should the dial pulse count be ten, then U12B

detects this condition and disables U14, but not data present pulse generator U6B and U13C. The numeric display regards the lack of output from U14, coincident with a data present pulse, to be the digit 0 and displays it as such.

4.104 Data Present Generator. Other commands of the end-of-digit detector are implemented through U6B. A 25-millisecond one-shot is inverted by U13C and passed through gates on A11 to the numeric display. Counter U10 is reset to zero by a one-millisecond pulse provided by Q8 at the trailing edge of the one-shot pulse. When the count is reset to zero, U12A is disabled through U11A and U13B, which in turn disables U14 until the next sequence of pulses.

4.105 Open-Collector Operation: BCD Data, Clear, and Data Present Commands. Clear command output U7C, data present output U13C, and data outputs of U14 are open-collector devices wired in parallel with similar drivers on MF Register A9, and in series with display-driving gates using pull-up resistors on A11. This wire-or design permits simultaneous use of the numeric display drivers on A11 from the MF-sourced data of A9 and the DP-sourced data of A10.

4.106 **BUFFER A11.**

4.107 The buffer card performs six main functions:

a. Provides current sinks for seven LEDs on A13, A14, and A15 upon receipt of commands from A3, A8, and A9;

b. Accepts from register A9 or dc input A10, and transimits to numeric display BCD digital data, digit present, error present, and clear information;

c. Latches any of the five code lamps until reception of a reset command;

d. Provides the error alarm relay and driver;

e. Provides the colon generator for MF errors;

f. Provides 14 of the 29 outputs to Accessory connector J23 on A17.

4.108 RS flip-flops U5C and U5D, U8 and U9 are set by simultaneous code signals from Decoder A8 and a lamp strobe signal from Register A9, which gates U6D and U7. Reset of all latches is accomplished by a signal on pin K (LAMP RESET, from A9).

4.109 The colon generator is formed by U2C, U2D, U2E and U2F. These open-collector devices, upon reception of the proper command from Error Detector A7, force the four BCD line stages low. The BCD output to DIGITAL DISPLAY U1 via U6A and U6B, and U4B and U4C, is the equivalent of decimal 10, which is displayed as a colon (ten dial pulses would result in a binary and decimal zero).

4.110 Digit present and error pulses are passed through NOR gate U5A and U5B, to drive the digital display and accessory connector J23. U3 and U4E and U4F are high-voltage and current-sink, open-collector devices routed to the accessory connector to protect the digital display and other TTL circuitry from the possiblity of non-TTL voltage levels appearing on J23 and causing damage to anything but U3 and U4.

4.111 **INTERCONNECTION A12.**

4.112 Card A12 provides:

a. Mounting for and approximately 110 interconnections among A1 through A11;

b. Access to the power transformer and power transistors via J18;

c. Fifty-six external connections via J19 to various controls, displays, and inputs at the front panel;

d. Terminal lugs for connection and maintenance of all DC supplies and the SF LEDs on A14 (Options 4 and 5);

e. A 34-pin connector attached to a flat ribbon cable to A17 and accessory connector J23.

4.113 **CODE, SUPERVISION, AND FREQUENCY LAMP BOARDS A13, A14, AND A15.**

4.114 These three boards consist entirely of light emitting diodes and current-limiting resistors for the LEDs. Each LED anode is connected to +5 Vdc and each cathode to a 100-ohm resistor. A7 provides all drivers for A15; A11 provides all drivers for A13 and the E&M LEDs of A14; A10 drives the OFF HOOK and LINE REV LEDS of A14; and, for options 4 and 5, A4 drives the four SF (VF) lamps of A14.

4.115 The code lamps (A13), SF (VF) lamps (if any, A14), and frequency lamps (A15) light for tone or code present. The other supervision lamps of A14 are dark (negative logic) supervision, i.e. lamp on equals idle (on-hook) circuit or line not reversed. The LINE REV lamp polarity may be inverted by REVERSAL switch S8.

4.116 **ACCESSORY A17.**

4.117 The Accessory board provides twenty-nine connections to Accessory connector J23 via J21 and J22 flat ribbon cable connectors to A12. These output leads provide TTL data concerning MF and SF (VF) (Options 4 and 5) frequencies, MF codes, supervision, digital data, error and digit present pulses and an input/output clear line.

WARNING

Do not remove the termination board from the numeric display without first mounting the metal shorting clip over the fingers of the lower display board. The remaining four leads are −12 Vdc, +5 Vdc, +250 Vdc, and ground connections. The three voltage leads are provided with additional filtering on the Termination Board to protect the numeric display.

SECTION 5

MAINTENANCE AND CALIBRATION

5.1 INTRODUCTION.

5.2 The six options of the Model 2762 do not require preventative maintenance. This section, therefore, provides only the information and instructions necessary to perform corrective maintenance, including: a performance check; troubleshooting; and calibration. All paragraphs in this section apply equally to all six options of the Model 2762 unless otherwise indicated. Sections 3 and 4 of this manual provide the theory of operation and circuit theory to supplement this section in troubleshooting and maintenance.

NOTE

It is advisable to contact the customer service department at the factory for technical assistance prior to calibration.

5.3 SERVICE INFORMATION.

5.4 Each instrument manufactured by Northeast Electronics is warranted for a period of one year upon delivery to the original purchaser. Complete warranty information is located on the rear of the title page of this manual. Note that written authorization is required prior to the return of any equipment for factory repairs. Additional service information can be obtained by contacting Northeast Electronics, Customer Service Department. P.O. Box 649, Concord, New Hampshire, 03301 telephone number 603-224-6521.

5.5 TEST EQUIPMENT.

5.6 Equipment recommended for testing, troubleshooting, and calibration of the Model 2762, together with the minimum specifications required for each, is listed in Table 5—1. If the recommended equipment is not available, other equipment that meets the minimum specifications can be used.

5.7 MAINTENANCE.

5.8 ACCESS/DISASSEMBLY.

5.9 To obtain access to all circuit boards in the Model 2762, proceed as follows:

PORTABLE UNITS

a. Loosen the four screws on the front panel.

b. Remove the two retaining screws on the bottom of the case.

c. Lift unit out of case.

d. Remove the two screws on the card retainer bracket.

RACK UNITS

a. Remove the two screws on the bottom of the rear of the unit.

b. Slide unit out through front of dust cover.

CAUTION

Do not remove A16 termination board from numeric display without first mounting metal shorting clip over fingers of lower display board.

5.10 PERFORMANCE CHECK.

NOTE

The following operations are simple, active signal response tests and do not include verification of the effective range of the MIN PULSE WIDTH, MIN REC LEVEL and VOLUME controls. Also the AUDIO ACC and EXT EQUIP RESET jacks are not checked.

5.11 Remove the power cord from the cover compartment and connect it to the 115 Vac power plug. Insert the other end into a 115 Vac, ± 10 Vac, 50 Hz to 60 Hz source. (If the 115V/230V switch S5 is in the 230 Vac position, insert plug into a 230 Vac, ± 20 Vac, 50 Hz to 60 Hz source).

5.12 Without additional connections to the unit, perform the following:

Table 5—1. Test Equipment Required.

Equipment Nomenclature	Required Specifications	Recommended Equipment
MF Sender	Fxd Freq: 700,900,1100,1300,1500,1700 Hz Freq. tol: ± 1% Output Level: +1 dB min. Output Impedance: 600 ohms	Northeast Electronics TTS 59B MF Sender
Frequency Counter	Accuracy: ± 1 count including time base accuracy Min. Freq. Range: 600 Hz to 2000 Hz Input Impedance: 100 kohms	Northeast Electronics TTS 80C Frequency Counter
Attenuator	Min. Range: 40 dB Impedance: 600 ohms	Daven (circuit T) type VT 795 G
AC Voltmeter	Min. Range: −40 dBm to +10 dBm Input Impedance: 10 M ohms	HP −400FL AC Voltmeter
Oscillator	Frequency: 600 Hz to 1800 Hz min. Max. Output Level: +10 dB min. Output Impedance: 600 ohms	HP 209A Oscillator
VOM	Max. Range dc volts: 300 volts min. Accuracy: 1.5% of full scale Input Impedance: 20 k ohms/volt	Triplet Model 630NA
Oscilloscope	Vertical Sensitivity: 0.1v/cm min. Sweep Speed: 10us/cm min. Probe: X1	Tektronix 504

ACTION	RESULT
a. Set AC POWER switch S4 to ON position.	Frequency indicators may be lit. All SUPERVISION lamps light. MF code lamps may be lit; Numeric display may show random digits. SF (VF) lamps light (Options 4 and 5).
b. Momentarily depress AUTO/REM/MAN RESET switch (S2) to MAN position.	All frequency and code lamps extinguish. Any digits displayed on numeric display are extinguished. Supervision lamps remain lit.

5.13 Test equipment needed for the following tests is listed below:

a. A loop dial pulse signaling device such as a DP telephone line and dialer; a Northeast Electronics TTS 41SAU-2 or TTS 41SAU-4 Service Analyzer Unit; or a Northeast Electronics TTS 59B MF Sender driving an A relay.

b. An E and M dial pulse signaling source, such as Northeast Electronics TTS 59B MF Sender or Northeast Electronics TTS 41SAU-4 Service Analyzer Unit.

5.14 Set the front panel controls of the TTS 2762, as follows:

a. AC POWER switch S4 to ON.

b. RESET switch S2 to AUTO position.

c. ERROR FUNCTION switch to OFF position.

d. VOLUME controls R1,R2 to midrange.

e. MAN/AGC switch S3 to AGC position.

f. MIN PULSE WIDTH control R4,R5 to 18 ms.

g. MIN REC LEVEL control R3 to −23 dB.

h. DISPLAY FUNCTION switch S1, see Table 5−2, step 1.

i. CAMA FUNCTION switch S6, see Table 5−2, step 1.

5.15 Table 5−2 is keyed to the text by step numbers that are associated with the switch positions of the DISPLAY FUNCTION and CAMA FUNCTION switches, and input jacks (L1,L2, E&M), used during different stages of the performance test.

Table 5−2. Input Selection.

STEP No.	DISPLAY FUNCTION SW (S1)	CAMA* FUNCTION SW (S6)	INPUT JACK
1	DP,L1	OFF	L1 (J4 or J5 or J2 & J3)
2	DP,L2	OFF	L2 (J6 or J7)
3	DP,L1	DP-MF	L1 (J4 or J5 or J2 & J3)
4	DP,L1	MF-MF	L1 (J4 or J5 or J2 & J3)
5	MF,BOTH	OFF	L1 (J4 or J5 of J2 & J3)
6	MF,L2	OFF	L2, (J6 or J7)
7	DP,E	OFF	L1 and E&M (J8 or J9,J4 or J5 or J2 & J3)
8	DP,M	OFF	L2 and E&M (J8 or J9,J6 or J7)

*** S6 not included in Options 4 and 5; delete steps 3,4.**

5.16 Proceed with the performance test by performing the actions and observing the results as described below:

ACTION	RESULT
a. Patch DP loop signaling device to Model 2762. See Table 5—2, step 1.	LINE REV lamp may extinguish (indicates line reversal).
b. Reverse input leads.	Line reverse lamp will change state.
c. Establish off-hook (common ground may be required to J1).	OFF HOOK lamp extinguishes.
d. Dial 0 through 9.	Speaker reproduces switching sounds. OFF HOOK lamp lights during each pulse with a slight delay after each transition. Numeric display indicates 0 to 9.
e. Establish on-hook for one second or longer; return to off-hook.	OFF HOOK lamp lights then extinghishes. Numeric display is cleared after on-hook/off-hook transition.
f. Set RESET switch (S2) to REM position. Dial 1,2,3. Establish on-hook for a second or longer; return to off-hook.	Numeric display indicates 1,2,3. The display is not cleared by on-hook/off-hook transition.
g. Short tip and ring of REMOTE RESET jack (J13 or J14 & J15) together or ground tip.	Numeric display cleared.
h. Return RESET switch (S2) to AUTO position. Refer to Table 5—2, and repeat directions included in paragraphs 5.16a, through 5.16e.	
i. Refer to Table 5—2, step 3 (omit for options 4 and 5). Patch from the MF sender to the Model 2762. Momentarily press RESET switch to MAN position, then return to AUTO position.	
j. Send KP, 0 through 9, ST, 1,2,3,MF signals from MF sender.	Speaker reproduces tones. Frequency lamps light for duration of input. Code lamps KP1 and ST light. Numeric display indicates 0 through 9 only. Supervision lamps idle (lit), indicates idle condition.
k. Refer to Table 5—2, step 4. (omit for options 4 and 5). Send KP, 0 through 9, 0 through 9 again, CD11 (ST3P), 0,1,2,3,CD12 (STP), 4,5,6, ST signals from MF sender.	ST lamp and numeric display extinghish after KP code. Numeric display indicates digits as received, 0 through 9 and 0 through 7. Last six digits but 3 (8,9,0,1,2,3) replace first six (0 to 5) on display; other fourteen digits remain displayed. KP,CD11,CD12 and ST lamps light after those codes are received. OFF HK and LINE REV lamps reflect line conditions. Last three digits (4,5,6) do not appear.
l. Establish on-hook condition for approximately one second; return to off-hook (omit for options 4 and 5).	Numeric and code lamp displays reset after on-hook/ off-hook transition. OFF HK lamp reflects line condition.

ACTION	RESULT
m. Using step 5 of Table 5—2, repeat actions in paragraph 5.16,j, and observe same results.	
n. Using step 6 of Table 5—2, repeat actions in paragraph 5.16,j, and observe same results.	
o. Refer to Table 5—2, step 7. Connect DP E lead signal source to input jack of the Model 2762. Momentarily press RESET switch to MAN position and return to KP (OFF HK) position.	
p. Establish an off-hook condition.	E and OFF HOOK supervision lamps extinguish.
q. Dial 0 through 9.	Speaker reproduces switching sounds. OFF HOOK and E supervision lamps light during each pulse with the E leading the OFF HOOK lamp. Numeric display indicates 0 through 9.
r. Establish on-hook for one second or longer; return to off-hook.	Numeric display clears after return to off-hook.
s. Refer to Table 5—2, step 8. Connect DP M signal source to the input jack of the Model 2762. Momentarily press RESET switch to MAN position.	
t. Establish an off-hook condition.	M and OFF HOOK supervision lamps extinguish.
u. Dial 0 through 9.	No signal reproduction from speaker. OFF HOOK and M supervision lamps light during each pulse with the E lamp leading the OFF HOOK lamp. Numeric display indicates 0 through 9.

5.17 TROUBLESHOOTING.

5.18 To facilitate troubleshooting, a Troubleshooting Guide, Table 5—3, is provided to allow the technician to isolate operational problems to individual printed circuit boards.

5.19 When using the Troubleshooting Guide, make the circuit checks (Possible Cause & Location) in the order listed, a before b, etc.. It is advisable to perform the Performance Test prior to troubleshooting in order to validate any complaints.

5.20 The block diagrams and circuit descriptions located in Section 4, along with the schematic diagrams located in Section 7, serve as valuable supplements in troubleshooting to help the technician pinpoint the problem.

WARNING

Lethal voltages are present in the power supply during operation, and for serveral minutes after turnoff.

Table 5—3. Model 2762, Troubleshooting Guide.

SYMPTOM	POSSIBLE CAUSE & LOCATION
1. Numeric display (1) fails to light or digits are only half lit. Digits are incorrectly placed. Digits skip spaces or replace previously displayed digits. Digits stack up at one end of the numeric display.	a. Check power supply voltages. b. An orange glow should be visible from rear of display. c. These symptoms indicate a faulty display. Consult factory before removing display.
2. One or more frequency lamps fail to light.	a. Check position of MAN/AGC switch S3 (should be in AGC). b. Speaker should reproduce MF tones thereby indicating a proper connection to the unit. c. Set MAN/AGC switch to MAN position and turn MIN REC LEVEL control fully cw. If lamps still fail to light, return MAN/AGC switch to AGC position. d. Check lamps by grounding pins A through F on A15. e. Check lamp drivers located on A7. f. Check selective detectors (A5,6) for proper outputs.
3. One or more code lamps fail to light.	a. While sending codes, check to see that proper frequency lamps light. b. Check lamps by grounding pins A through F on A13. c. Check for proper setting of the MIN PULSE WIDTH control (fully ccw). d. Check lamp drivers located on A11. e. Check MF decoder (A8) for proper decoding of MF frequencies.
4. E or M Supervision lamps fail to light and/or operate properly.	a. If lamps fail to light, (normal condition is on) check lamps by grounding pins C and B on A14. b. Check lamp drivers located on A11. c. Check E and M level detectors on A3.

Table 5—3. (cont).

SYMPTOM	POSSIBLE CAUSE & LOCATION
5. OFF HOOK and/or LINE REV lamps fail to light and/or operate properly.	a. Model 2762 must be grounded to obtain OFF HK. b. Check lamps by grounding pins D and E on PC2. c. Check lamp driver circuitry on A10.
6. Numeric display fails to reset.	a. Check position of reset switch. b. Check reset circuitry on A9.
7. Ext Equip relay fails to operate.	a. Check relay K1 on A3.
8. Speaker is dead/noisy or has low volume.	a. Check volume controls for full cw setting. b. Check audio circuits on A3.
9. ACC AUDIO output low or non-existant.	a. Check volume controls for full cw setting. b. Check audio circuits located on A3.
10. Unit fails to display MF digits in AGC mode of operation.	a. Check AGC circuitry on A2. b. Check Q1 on A3.
11. Unit fails to operate when in MAN mode of operation.	a. Check setting of MIN REC LEVEL control. b. Check MIN REC LEVEL control circuitry on A3.
12. Unit fails to display dial pulse digits.	a. Model 2762 requires common ground with dialing system. b. Check position of DISPLAY FUNCTION switch. c. Check position of MIN PULSE WIDTH control. d. Check dial pulse circuitry on A10.

5.21 CALIBRATION.

5.22 The following procedures allow calibration of individual boards after repair or complete calibration of the Model 2762.

NOTE

Prior to calibration it is advisable that the factory be contacted for technical assistance.

CAUTION

Refer to Installation Diagram, Figure 3—1, for proper orientation of cards prior to insertion into respective slots.

5.23 Connect the Model 2762 to a proper power source (115 Vac ± 10 Vac, 50 Hz to 60 Hz), (230 Vac, ± 20 Vac, 50/60 Hz for options 2,3,4, and 5).

5.24 POWER SUPPLY (A1).

5.25 To calibrate the power supply, proceed as follows:

a. With AC POWER switch OFF, remove card 1.

b. Plug A1 into extender and insert into card slot 1.

c. Push AC POWER switch on.

d. Using a VOM, measure voltage with respect to ground on pin 21, on card 1. Should be +12 Vdc ± 0.1 Vdc. If out of tolerance, adjust R16.

NOTE

Adjustment of R16 will affect all power supply output voltages. Do not use this adjustment to correct other power supply output voltages.

e. Check dc voltages on pins 20,22 and 4 against the tolerances listed in Table 5—4.

f. If the +250 Vdc output is out of tolerance, adust R7.

g. Push AC POWER switch off.

h. Remove extender and install A1 in its slot.

5.26 MAIN INPUT, (A3).

5.27 To calibrate the main input card, proceed as follows:

a. With AC POWER switch off, remove A3.

b. Plug A3 into extender and insert into card 3 slot.

c. Set following front panel controls on Model 2762 to positions indicated:

1. DISPLAY FUNCTION switch to MF BOTH.
2. MAN/AGC switch to AGC.
3. AC POWER on.

d. Patch from TTS 59B MF Sender to attenuator input.

Table 5—4. Power Supply Specifications.

TEST POINT*	DC VOLTAGE	RIPPLE (MAX.)
Pin 21	+12V ± 0.1 V	15 mVac
Pin 20	−12 V ± 0.3 V	15 mVac
Pin 22	+5 V ± 0.2 V	35 mVac
Pin 4	+250 V ± 2.0 V	1.5 Vac
* All voltage readings taken with respect to ground (pin 1)		

e. Patch from attenuator output to one of L1 jacks located on Model 2762 front panel.

f. Using MF sender, send a continuous MF signal of digit 6 at a level of +1.0 dBm ± 0.1 dBm.

g. Connect HP 400FL AC Voltmeter to junction of RV1 and R38 (reference to ground) on A3.

h. Adjust attenuator until a level of −15 dBm ± 0.1 dBm is observed on ac voltmeter.

i. Disconnect ac voltmeter from junction of RV1 and R38 and connect it to Test Point 1.

j. Without changing input level, measure and record level observed on ac voltmeter.

k. Remove patch cord from L1 input jack and insert into one of the L2 input jacks. Do not readjust input level.

l. Disconnect ac voltmenter from TP1 and connect to TP2 on A3.

m. Observe signal level monitored by the ac voltmeter and, if necessary adjust potentiometer R49 to obtain a level equal to the recorded level monitored at TP1.

n. Disconnect ac voltmeter from TP2 and connect to TP3.

o. Level monitored at TP3 should be −15 dBm ± 0.1 dBm. If necessary, adjust potentiometer R51 to obtain this reading.

p. Disconnect ac voltmeter from A3 and connect it to attenuator output.

q. Set attenuator to obtain a −23 dBm, ± 0.1 dBm indication on ac voltmeter.

r. Set Model 2762 MIN REC LEVEL control to −23 dB position.

s. Set MAN/AGC switch to MAN position.

t. Adjust potentiometer R7 on A3 until 1100 and 1300 lamps on Model 2762 front panel are just lit (not flickering).

u. Push Model 2762 AC POWER switch off.

v. Disconnect all test equipment from Model 2762; remove extender and install A3 in slot 3.

5.28 MF INPUT, (A2).

5.29 To calibrate the MF Input card, proceed as follows:

a. With AC POWER switch off, remove A2 from Model 2762.

b. Plug A2 into extender and insert into card 2 slot.

c. Perform steps described in paragraphs 5.27 c,d, and e.

d. Using MF sender, send a continuous MF signal of digit 6 at a level of −6 dBm ± 0.1 dBm.

e. Using ac voltmeter, monitor test point two (TP2) on A2, with reference to ground. Meter should indicate −27 ± 0.2 dBm; if not, adjust potentiometer R20 for correct indication.

f. Disconnect ac voltmeter from Model 2762 and connect it to output connectors of attenuator.

g. Set attenuator to obtain a −25 dBm, ± 0.1 dBm indication on ac voltmeter.

h. Adjust potentiometer R33 clockwise until 1100 and 1300 lamps on Model 2762 are extinguished.

i. Slowly adjust R33 counterclockwise until same frequency lamps are just lit (not flickering).

j. Push Model 2762 AC POWER switch off.

k. Disconnect all test equipment from Model 2762; remove extender card and install A2 into slot 2.

5.30 MF INPUT, OPTIONS 4 AND 5 (A2).

5.31 To calibrate the dual AGC of Options 4 and 5, proceed as follows:

a. Perform steps described in paragraphs 5.29,a to 5.29,f; except −27 dBm level is observed at test point three.

b. Repeat steps described in paragraphs 5.29,a to 5.29,f, except apply MF signal to L2 jacks and monitor test point six (TP6) on A2 for −27 dBm; adjust R60 as required.

c. Apply 2600 Hz signal at −25 dBm to L2 jacks; monitor attenuator output with ac voltmeter.

d. Adjust R75 until the level at test point five (TP5) on A2 switches from −12V to +12V.

Table 5—5. Filter Frequency Chart For SF (VF) and MF Detectors (A4,A5,A6).

CARD	FILTER	CENTER FREQUENCY (Hz)	FILTER SECTION	PEAK FREQUENCY Hz
A4	F1	2400	F1A	2395
			F1B	2405
	F2	2400	F2A	2395
			F2B	2405
	F3	2600	F3A	2595
			F3B	2605
	F4	2600	F4A	2595
			F4B	2605
A5	F1	700	F1A	675
			F1B	725
	F2	900	F2A	875
			F2B	925
	F3	1100	F3A	1075
			F3B	1125
A6	F1	1300	F1A	1275
			F1B	1325
	F2	1500	F2A	1475
			F2B	1525
	F3	1700	F3A	1675
			F3B	1725

e. Apply 2600 Hz signal at −25 dBm to L1 jacks. Adjust R34 until the level at test point two (TP2) switches from −12V to +12V.

5.32 **MAIN INPUT CARD, OPTIONS 4 AND 5 (A3).**

a. Place A3 on extender card and insert into card 3 slot.

b. Apply MF digit one to L1 at −6 ± 0.1 dBm.

c. Monitor test point three (TP3) on A3 with ac voltmeter. Adjust R51 for a level of −27 ± 0.1 dBm at TP3.

d. Apply MF digit one to L2 at −6 ± 0.1 dBm.

e. Adjust R49 for −27 ± 0.1 dBm at level TP3.

f. Repeat steps described in paragraphs 5.27,p through 5.27,v.

5.33 **SF (VF) AND MF DETECTORS (A4,A5,A6).**

5.34 The following calibration procedure is for tuning filter F1 on A5 to a center frequency of 700 Hz. The format is the same for filters F2 and F3; for F1,F2 and F3 on A6; and (options 4 and 5) for F1,F2,F3 and F4 on A4.

5.35 Refer to Figures 5−1 and 5−2 for calibration controls and their locations and to Table 5−5 for filter identification and associated frequencies.

5.36 Prior to calibration of the MF filter card, isolate F1 (A5, 700 Hz) as follows:

NOTE

Use proper soldering techniques in performing the following steps.

a. With AC POWER switch off, remove A5 from Model 2762.

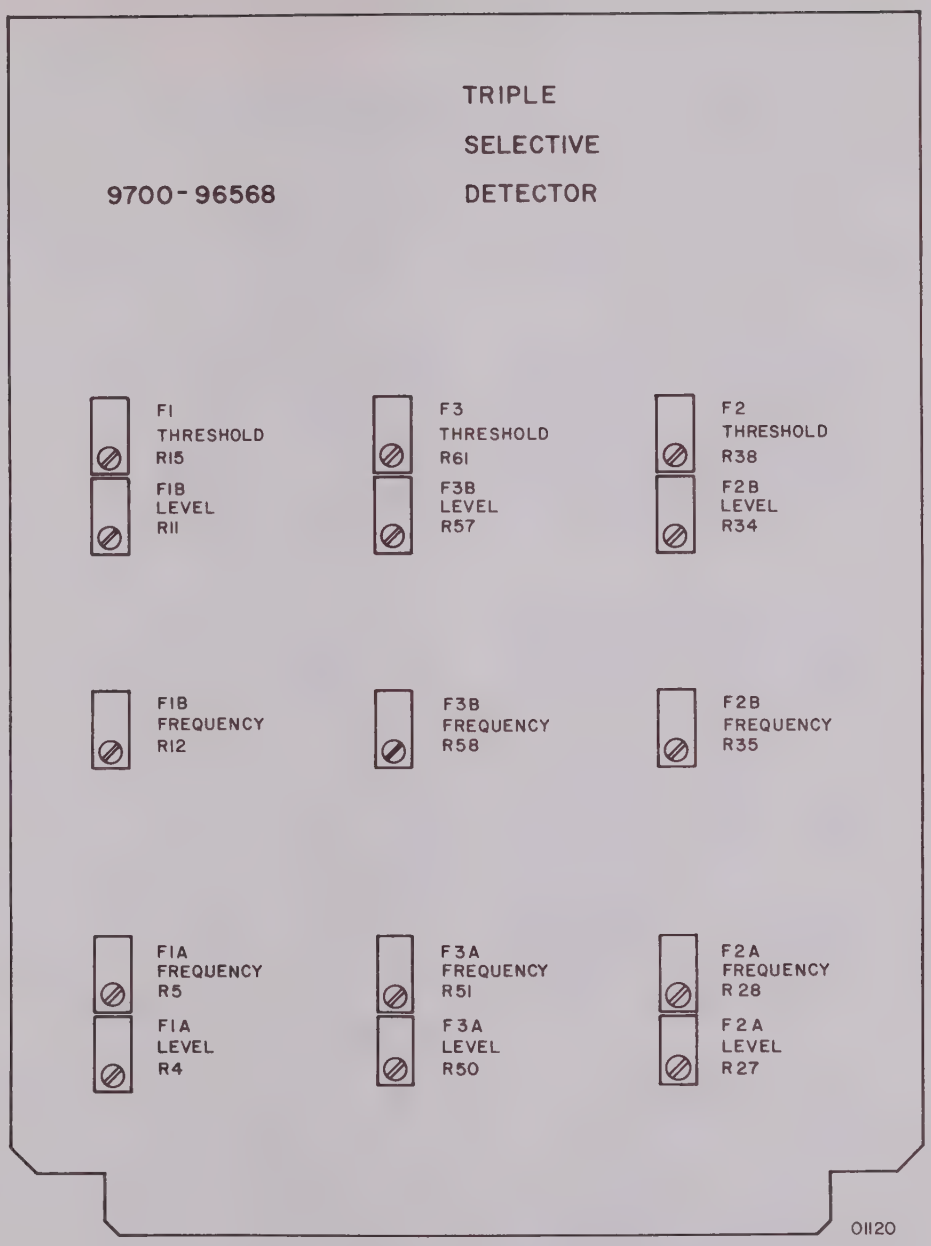


Figure 5—1. Model 2762 Triple Selective Detector Calibration Control Function And Location.

b. Unsolder the end of resistor R1 common with capacitor C1.

Unsolder the end of resistor R8 common with pin 5 on printed circuit board.

5.37 To isolate input of filter F2, perform the following steps:

a. Unsolder the end of resistor R24 common with capacitor C9.

b. Unsolder the end of resistor R31 common with pin 16 of printed circuit board.

5.38 To isolate input of filter F3, perform the following steps:

a. Unsolder the end of resistor R47 common with capacitor C17.

b. Unsolder the end of resistor R54 common with pin 11 of the printed circuit board.

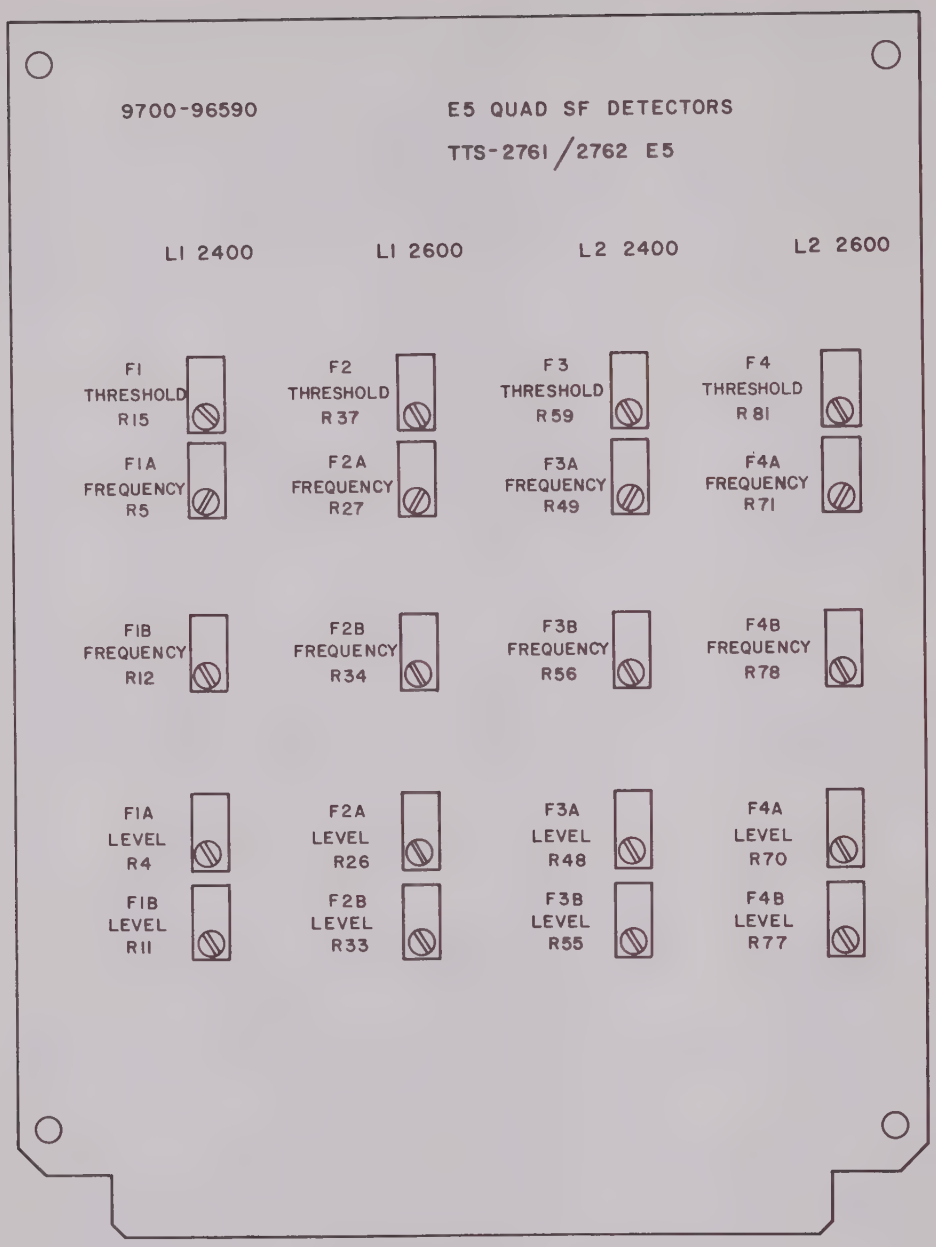


Figure 5—2. Model 2762 Quad SF (VF) Detector Calibration Control Function and Location.

5.39 To isolate F1,F2,F3 or F4 of A4 only (options 4 and 5).

a. Unsolder the end of resistor R1,R45,R23 or R67 common with capacitor C1,C17,C9, or C25 respectively.

b. Unsolder the end of resistor R8,R52,R30, or R74 common with pin 5,16,11 or 15 respectively on printed circuit board.

5.40 Prior to pushing the AC POWER switch of the Model 2762 on, plug A5 into the extender and install in slot 5. Remove A3.

5.41 Initial set up of the test equipment is as follows:

a. Patch from HP209A oscillator output jacks to input of attenuator and TTS 80C frequency counter (TTS 80C IMPEDANCE switch in BRIDGE position).

b. Connect attenuator output to the unsoldered end of resistor R1 and ground (pin 2B).

c. Connect output of oscillator to input of ac voltmeter.

d. Set output frequency of oscillator to 700 Hz and output level for a -25 ± 0.1 dBm reading on ac voltmeter.

e. Disconnect ac voltmeter from oscillator and connect to output terminals of attenuator.

f. Set attenuator for a -30 dBm $\pm$ 0.1 dBm reading on ac voltmeter.

g. Disconnect ac voltmeter from attenuator, and connect it to junction of potentiometer R4 and resistor R6, with reference to ground (pin 2B).

h. Connect a lead from chassis ground, on the Model 2762, to chassis ground of Tektronix 504 oscilloscope.

i. Connect input of oscilloscope to pin 6F on A5.

5.42 Set the oscilloscope controls as follows:

a. Sweep Time/cm to 5.0 ms/cm.

b. Input to AC.

c. Vertical Sensitivity to 5 V/cm.

d. Triggering:

1. Trigger Level to Auto.

2. Source to Internal.

3. Coupling to AC.

4. Slope to plus.

5.43 Adjust the attenuator output level for a -30 dBm $\pm$ 0.2 dBm reading on the ac voltmeter.

5.44 With the intensity, focus, and position controls on the oscilloscope set to provide a good midscreen display of the signal, one of two conditions of the waveform should appear:

a. An apparent straight line.

b. Oscillations (distorted waveforms).

5.45 If the sweep is an apparent straight line, adjust potentiometer R4 (F1A) in a counterclockwise direction (Figures 5—1 and 5—2), until the filter goes into oscillation and then in a clockwise direction until the oscillations disappear.

5.46 If oscillations are already present, adjust potentiometer R4 in a clockwise direction until the oscillations disappear.

5.47 Adjust the oscillator frequency until a peak level is observed on the ac voltmeter. This indicates the peak frequency of the filter. Adjust R7 until the ac voltmeter indicates -10 dBm, $\pm$ 0.1 dBm.

5.48 Observe the frequency counter. It should indicate 675 $\pm$ 2.0 Hz at the peak frequency of the first filter section (F1A). If the frequency is too low, adjust R5 in a clockwise direction until the proper peak frequency is obtained. The peak frequency is found by adjusting the oscillator frequency after each adjustment of R5 until the peak level indication is coincident with the desired peak frequency. Then adjust potentiometer R4 for a -10 dBm level indication on the ac voltmeter.

5.49 To calibrate the second filter section (F1B) for peak frequency, connect the test equipment in the following manner:

a. Disconnect attenuator from R1 and connect to the unsoldered end of R8.

b. Disconnect ac voltmeter from junction of potentiometer R4 and R6 and connect to the junction of potentiometer R11 and R13.

5.50 To calibrate the second filter section (F1B), follow the same procedure outlined in paragraphs 5.44 through 5.48 for the first filter section F1A, except for the following deviations:

a. Peak frequency is 725 Hz, ± 2.0 Hz.

b. Adjust potentiometer R11 instead of R4 for level and potentiometer R12 instead of R5 for peak frequency.

NOTE

The deviations reflect the information found on Table 5—5 and Figure 5—1.

5.51 After the two filter sections are calibrated, disconnect the attenuator from R8 and connect to pin 7H of A5.

5.52 Push the Model 2762 AC POWER switch off.

5.53 Solder resistors R1 and R8 back onto the printed circuit board.

5.54 Push the Model 2762 AC POWER switch on.

5.55 Set the output frequency of the oscillator to 100 Hz, ± 1.0 Hz below the desired center frequency, in this case 600 Hz, since the center frequency is 700 Hz as indicated on Table 5—5.

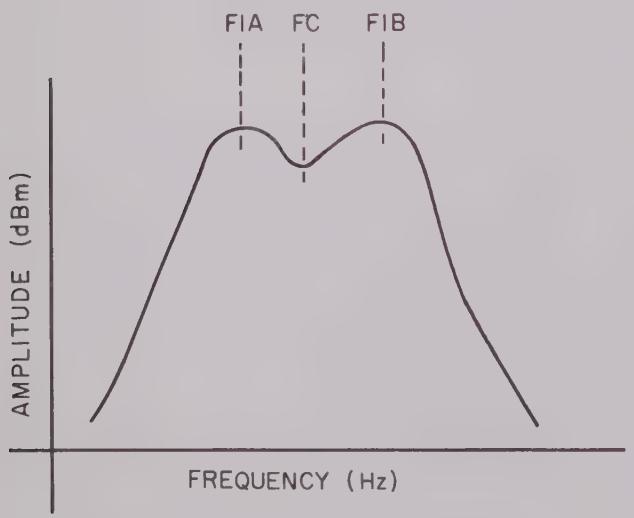
5.56 While observing the ac voltmeter and frequency meter, slowly adjust the oscillator frequency toward 800 Hz (100 Hz above center frequency) and note the meter readings. The first peak should represent approximately 675 Hz, the valley approximately 700 Hz, and the second peak approximately 725 Hz. At this time, the peaks may be of any level. See Figure 5—3 for graphic representation of level and frequency indications.

5.57 After having observed the pattern, tune to the greater peak and observe the indication on the frequency counter. If the frequency is approximately 675 Hz, the peak is F1A. If the peak is approximatley 725 Hz, the peak is F1B. This may be determined by referring to Table 5—5 for A5 F1A,F1B.

5.58 Adjust the potentiometer for whichever peak has been tuned, potentiometer R4 for peak F1A; potentiomenter R11 for peak F1B. Adjust the potentiometer in a clockwise direction to decrease the level. Do not decrease below the level of center frequency (valley).

5.59 For example: Referring to Figure 5—4, if the highest peak was F1A, its amplitude was +1.8 dBm, and the amplitude of the valley was —1.2 dBm, potentiometer R4 would be turned clockwise until the peak of F1A amplitude was —0.8 dBm, or approximately 0.4 dB higher than the valley.

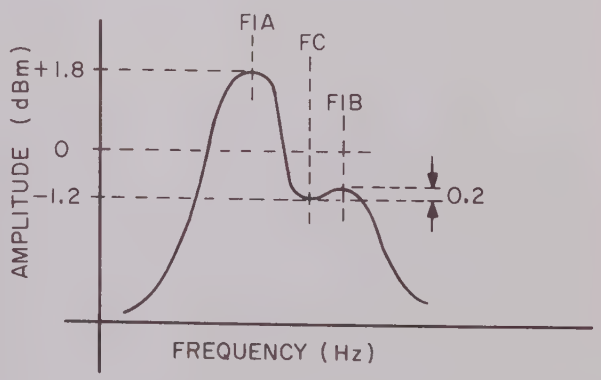
5.60 Tune the oscillator to the second peak level (F1B) on the ac voltmeter.



FIA = 675 Hz
FC = 700 Hz
FIB = 725 Hz

00603

Figure 5—3. 700 Hz Selective Detector Response after Filter Frequency Calibration.



FIA = 675 Hz
FC = 700 Hz
FIB = 725 Hz

00602

Figure 5—4. 700 Hz Selective Detector Response after F1A Level Adjustment.

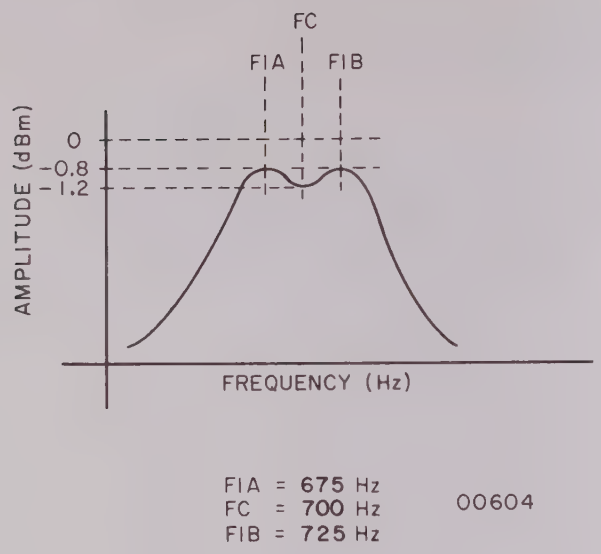


Figure 5—5. 700 Hz Selective Detector Response After F1A and F1B Calibration.

5.61 Adjust potentiometer R11 slightly in the clockwise direction until the level is −0.8 dBm, or 0.4 dB above the center frequency amplitude, the same as F1B.

5.62 Since adjusting the peaks has an effect on the overall response pattern, it may be necessary to continue tuning and adjusting R4 and R11 until a response similar to Figure 5—5 is obtained.

5.63 Tune the oscillator to the valley of the response curve (700 Hz) and observe the oscilloscope to see if the output pin F is high (approximately +5.0 Vdc).

5.64 Set the oscillator frequency to 100 Hz below center frequency then, while observing the ac voltmeter, frequency counter and oscilloscope, slowly sweep the range of frequencies from 100 Hz below to 100 Hz above center frequency. Check for the following:

a. Peaks are within 0.4 dB of the valley in the response.

b. Frequencies should be within 5 Hz low of F1A (625 Hz) before the output at pin F goes high, as shown on the oscilloscope, and within 5 Hz above F1B (725 Hz) before it goes low.

5.65 Disconnect the ac voltmeter from the junction of potentiometer R11 and R13, and connect to the output terminals of the attenuator.

5.66 Set oscillator frequency to 700 Hz, ± 1.0 Hz.

5.67 Set the attenuator for a −37 dBm reading on the ac voltmeter.

5.68 The oscilloscope should indicate one of two conditions, a high (approximately +5.0 Vdc) or low (approximately 0 Vdc) output appearing on pin F.

5.69 If a high output is monitored, adjust potentiometer R15 (threshold) in a counterclockwise direction until the output goes low; then clockwise until the output just goes high.

5.70 If a low output is monitored, adjust potentiometer R15 clockwise until the output at pin F just goes high.

5.71 **RESPONSE TIME ADJUSTMENT (A5 AND A6 ONLY).**

5.72 Attach channel one scope probe to junction of R1 and C1; attach channel two scope probe to pin 6 of printed circuit board. Set oscilloscope controls as follows:

a. Sweep time/cm to 1 ms/cm.

b. Input of both channels to DC.

c. Vertical sensitivity of channel one to most sensitive (clockwise) position.

d. Vertical sensitivity of channel two to 1 V/cm.

e. Triggering: channel one, auto, internal, ac coupling, positive slope.

f. Display to chop.

5.73 Observe oscilloscope channel two as 700 Hz ± 2 Hz at −30 dBm is intermittently applied to pin 7 on the printed circuit board. A positive-going pulse should occur within 7.5 ± 0.5 milliseconds after each presentation of input (channel one). Adjust R15 clockwise to decrease delay as required.

5.74 Push AC POWER switch off. Remove extender card and replace A3 and A5.

SECTION 6

ELECTRONIC PARTS LIST

6.1 INTRODUCTION.

6.2 This section provides the parts lists and associated component location diagrams for location and identification of parts. Tables 6—1 through 6—27 are the parts list and Figures 6—1 through 6—20 are the component location diagrams.

Table 6—1. Model 2762, Overall Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
A1	PS BD ASSY 95875						A27611CC10
A2	MF INPUT ACO ASSY 95883						A27611C011
A3	ASSY A3 MAIN INPUT						A2762C2C12
A5	ASSY A5 MF DET 7/9/11						A2762C2013
A6	ASSY A6 MF DET 13/15/17						A276202014
A7	ASSY A7 MF ERROR DET						A276202015
A8	DECODER ASSY 95874						A27611CC16
A9	ASSY A9 REGISTER						A2762C2016
A10	DC INPUT ASSY CARD 10						A2762CC015
A11	ASSY A11 BUFFER						A2762C2C17
A12	ASSY A12 INTERCONN						A2762C2018
A13	KP LAMP BD 95935						A276111C10
A14	ASSY A14 SUPERVISION						A2762C2C19
A15	FREQ LAMP BD 95937						A276111C12
A16	TERM BD ASSY 95932						A276111C13
A17	ASSY A17 ACCESSORY						A276202020
F1	FUSE SLO-BLO				BUSSMAN	MDL	8631C14C0
F2	FUSE, SLO-BLO				BUSSMAN	MDL	8631C17C0
J1	BINDING POST METAL GND				H H SMITH	137SP	6525CC1C0
J2	BINDING POST-RED				GRAYHILL	29-1R	652400400
J3	BINDING POST-BLK				GRAYHILL	29-1B	652400300
J4-13	HI-D				SWCRFT	M-112B	650101300
J14	BINDING POST-RED				GRAYHILL	29-1R	652400400
J15	BINDING POST-BLK				GRAYHILL	29-1B	652400300
J16	3-PIN	6A		250V	BELDEN	17252	652201700
LS1	SPEAKER 45 OHM				QUAM	25A07-Z45	926C002C0
R1	1K-1K	1/2W			CLARCSTAT	CM41156	238001023
R2	1K-1K	1/2W			CLARCSTAT	CM41156	238001023
R3	5K	2W	10%		OH MITE	CU-5021	232005020
R4	POT DUAL 150K-50K				AB	JJ97480	238001540
R5	POT DUAL 150K-50K				AB	JJ97480	238001540
R6	11.5K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220211521
R7	105K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210531
R8-13	1K	1/4W	10%		AB	TYPE CB	200101026
S1	STRAPPING S-1						A276202022
S2	4PDT				C+K	7413P3H3CB	620402300
S3	SPDT	5A		28V	C+K COMP	7101P3YZB	62040C100
S4	DPDT 5A IN RUSH			250V	ALCO	MTF-206N	62070C0C1
S5	DPDT LOCKING				SWCRFT	46206LF	6455CC2C0
S6	DPDT	5A		28V	C+K COMP	7211P3YZB	620401000
S7	SPDT	5A		28V	C+K COMP	7101P3YZB	62040C1C0
S8	DPDT	5A		28V	C+K COMP	7201P3DZB	620400600
TP1	TIEPOINT,DOUBLE				IEH	TS-607	83640C2C0
TP2	TIEPOINT,FOUR TERM				IEH	STS0531-4	83640C6C0
U1	16POS				BURROUGHS	SSO-10C00041	720100800
W1	W1 CABLE ASSY & INSTALL						A276202023

Table 6—2. Model 2762 R, Overall Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
A1	PS BD ASSY 95875						A27611CC10
A2	MF INPUT A60 ASSY 95883						A27611C011
A3	ASSY A3 MAIN INPUT						A276202C12
A5	ASSY A5 MF DET 7/9/11						A276202C13
A6	ASSY A6 MF DET 13/15/17						A276202C14
A7	ASSY A7 MF ERROR DET						A276202C15
A8	DECODER ASSY 95874						A276110C16
A9	ASSY A9 REGISTER						A276202016
A10	DC INPUT ASSY CARD 10						A2762CCC15
A11	ASSY A11 BUFFER						A276202017
A12	ASSY A12 INTERCONN						A276202018
A13	KP LAMP BD 95935						A276111010
A14	ASSY A14 SUPERVISION						A2762C2C19
A15	FREQ LAMP BD 95937						A276111C12
A16	TERM BD ASSY 95932						A276111013
A17	ASSY A17 ACCESSORY						A2762C2C20
F1	FUSE SLO-BLO				BUSSMAN	MDL	863101400
F2	FUSE, SLO-BLO				BUSSMAN	MDL	863101700
J1	BINDING POST METAL GND				H H SMITH	137SP	652500100
J2	BINDING POST-RED				GRAYHILL	29-1R	652400400
J3	BINDING POST-BLK				GRAYHILL	29-1B	652400300
J4-13	HI-D				SWCRFT	M-112B	650101300
J14	BINDING POST-RED				GRAYHILL	29-1R	652400400
J15	BINDING POST-BLK				GRAYHILL	29-1B	652400300
J16	3-PIN	6A		250V	BELDEN	17252	652201700
J24	18 CONTACT				CINCH	18-140Y	850002300
LS1	SPEAKER 45 OHM				QUAM	25A07-Z45	926C0C2C0
R1	1K-1K	1/2W			CLAROSTAT	CM41156	238001023
R2	1K-1K	1/2W			CLAROSTAT	CM41156	238001023
R3	5K	2W	10%		OH MITE	CU-5C21	232005020
R4	POT DUAL 150K-50K				AB	JJ97480	238001540
R5	POT DUAL 150K-50K				AB	JJ97480	238001540
R6	11.5K	1/6W	1%		ELECTRA	RN55 SIZE 100 PPM	220211521
R7	105K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210531
R8-13	1K	1/4W	10%		AB	TYPE CB	2CC101026
S1	STRAPPING S-1						A276202022
S2	4PDT				C+K	7413P3H3CB	6204C2300
S3	SPDT	5A		28V	C+K COMP	7101P3YZB	620400100
S4	DPDT 5A IN RUSH			250V	ALCO	MTF-206N	620700001
S5	DPDT LOCKING				SWCRFT	46206LF	645500200
S6	DPDT	5A		28V	C+K COMP	7211P3YZB	620401000
S7	SPDT	5A		28V	C+K COMP	7101P3YZB	620400100
S8	DPDT	5A		28V	C+K COMP	7201P3DZB	620400600
TP1	TIEPOINT,DOUBLE				IEH	TS-607	836400200
TP2	TIEPOINT,FOUR TERM				IEH	STS0531-4	836400600
U1	16POS				BURROUGHS	SSD-10000041	720100800
W1	ASSY P1/P2 CABLE RACKS						A276203014

Table 6—3. Model 2762, Option 4, Overall Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
A1	PS BD ASSY 95875						A276110010
A2	ASSY A2 E5 DUAL AGC						A276274015
A3	ASSY A3 MAIN INPUT						A276202012
A4	ASSY A4 E5 QUAD SF DET						A276274016
A5	ASSY A5 MF DET 7/9/11						A276202013
A6	ASSY A6 MF DET 13/15/17						A276202014
A7	ASSY A7 E5 MF ERROR DET						A276274012
A8	ASSY A8 DECODER CCITTS						A276274017
A9	ASSY A9 REGISTER						A276202016
A10	DC INPUT ASSY CARD 10						A276200015
A11	ASSY A11 BUFFER						A276202017
A12	ASSY A12 INTERCONN						A276202018
A13	KP LAMP BD 95935						A276111010
A14	ASSY A14 E5 SUPERVISION						A276274013
A15	FREQ LAMP BD 95937						A276111012
A16	TERM BD ASSY 95932						A276111013
A17	ASSY A17 ACCESSORY						A276202020
F1	FUSE SLO-BLO				BUSSMAN	MDL	863101400
F2	FUSE, SLO-BLO				BUSSMAN	MDL	863101700
J1	BINDING POST METAL GND				H H SMITH	137SP	652500100
J2	BINDING POST-RED				GRAYHILL	29-1R	652400400
J3	BINDING POST-BLK				GRAYHILL	29-1B	652400300
J4-13	HI-D				SWCRFT	M-112B	650101300
J14	BINDING POST-RED				GRAYHILL	29-1R	652400400
J15	BINDING POST-BLK				GRAYHILL	29-1B	652400300
J16	3-PIN	6A		250V	BELDEN	17252	652201700
LS1	SPEAKER 45 OHM				QUAM	25A07-Z45	926000200
R1	1K-1K	1/2W			CLAROSTAT	CM41156	238001023
R2	1K-1K	1/2W			CLAROSTAT	CM41156	238001023
R3	5K	2W	10%		OH MITE	CU-5021	232005020
R4	POT DUAL 150K-50K				AB	JJ97480	238001540
R5	POT DUAL 150K-50K				AB	JJ97480	238001540
R6	11.5K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220211521
R7	105K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210531
R8-13	1K	1/4W	10%		AB	TYPE CB	200101026
S1	STRAPPING S-1						A276202022
S2	4PDT				C+K	7413P3H3CB	620402300
S3	SPDT	5A		28V	C+K COMP	7101P3YZB	620400100
S4	DPDT 5A IN RUSH			250V	ALCO	MTF-206N	620700001
S5	DPDT LOCKING				SWCRFT	46206LF	645500200
S7	SPDT	5A		28V	C+K COMP	7101P3YZB	620400100
S8	DPDT	5A		28V	C+K COMP	7201P3DZB	620400600
TP1	TIEPOINT,DOUBLE				IEH	TS-607	836400200
TP2	TIEPOINT,FOUR TERM				IEH	STS0531-4	836400600
U1	16PCS				BURROUGHS	SSD-10000041	720100800
W1	W1 CABLE ASSY & INSTALL						A276202023

Table 6—4. Model 2762R, Option 5, Overall Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
A1	PS BD ASSY 95875						A276110010
A2	ASSY A2 E5 DUAL AGC						A276274015
A3	ASSY A3 MAIN INPUT						A276202012
A4	ASSY A4 E5 QUAD SF DET						A276274016
A5	ASSY A5 MF DET 7/9/11						A276202013
A6	ASSY A6 MF DET 13/15/17						A276202014
A7	ASSY A7 E5 MF ERROR DET						A276274012
A8	ASSY A8 DECODER CCITTS						A276274017
A9	ASSY A9 REGISTER						A276202016
A10	DC INPUT ASSY CARD 10						A276200015
A11	ASSY A11 BUFFER						A276202017
A12	ASSY A12 INTERCONN						A276202018
A13	KP LAMP BD 95935						A276111010
A14	ASSY A14 E5 SUPERVISION						A276274013
A15	FREQ LAMP BD 95937						A276111012
A16	TERM BD ASSY 95932						A276111013
A17	ASSY A17 ACCESSORY						A276202020
F1	FUSE SLO-BLO				BUSSMAN	MDL	8631C1400
F2	FUSE, SLO-BLO				BUSSMAN	MDL	863101700
J1	BINDING POST METAL GND				H H SMITH	137SP	652500100
J2	BINDING POST-RED				GRAYHILL	29-1R	652400400
J3	BINDING POST-BLK				GRAYHILL	29-1B	652400300
J4-13	HI-D				SWCRFT	M-112B	6501C1300
J14	BINDING POST-RED				GRAYHILL	29-1R	652400400
J15	BINDING POST-BLK				GRAYHILL	29-1B	652400300
J16	3-PIN	6A		250V	BELDEN	17252	652201700
J24	18 CONTACT				CINCH	18-140Y	850002300
LS1	SPEAKER 45 OHM				QUAM	25A07-Z45	926000200
R1	1K-1K	1/2W			CLAROSTAT	CM41156	238001023
R2	1K-1K	1/2W			CLAROSTAT	CM41156	238001023
R3	5K	2W	10%		OH MITE	CU-5021	232005020
R4	POT DUAL 150K-50K				AB	JJ97480	238001540
R5	POT DUAL 150K-50K				AB	JJ97480	238001540
R6	11.5K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220211521
R7	105K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210531
R8-13	1K	1/4W	10%		AB	TYPE CB	200101026
S1	STRAPPING S-1						A276202022
S2	4PDT				C+K	7413P3H3CB	620402300
S3	SPDT	5A		28V	C+K COMP	7101P3YZB	6204001C0
S4	DPDT 5A IN RUSH			250V	ALCO	MTF-206N	62070C001
S5	DPDT LOCKING				SWCRFT	46206LF	6455002C0
S7	SPDT	5A		28V	C+K COMP	7101P3YZB	620400100
S8	DPDT	5A		28V	C+K COMP	7201P3DZB	620400600
TP1	TIEPOINT,DOUBLE				IEH	TS-607	836400200
TP2	TIEPOINT,FOUR TERM				IEH	STS0531-4	836400600
U1	16POS				BURROUGHS	SSD-10000041	720100800
W1	ASSY P1/P2 CABLE RACKS						A276203014

Table 6—5. Model 2762, Power Switch Assembly S4 Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
DS1	T 1-3/4	80MA		14V	CHICAGO	CM386	730003700

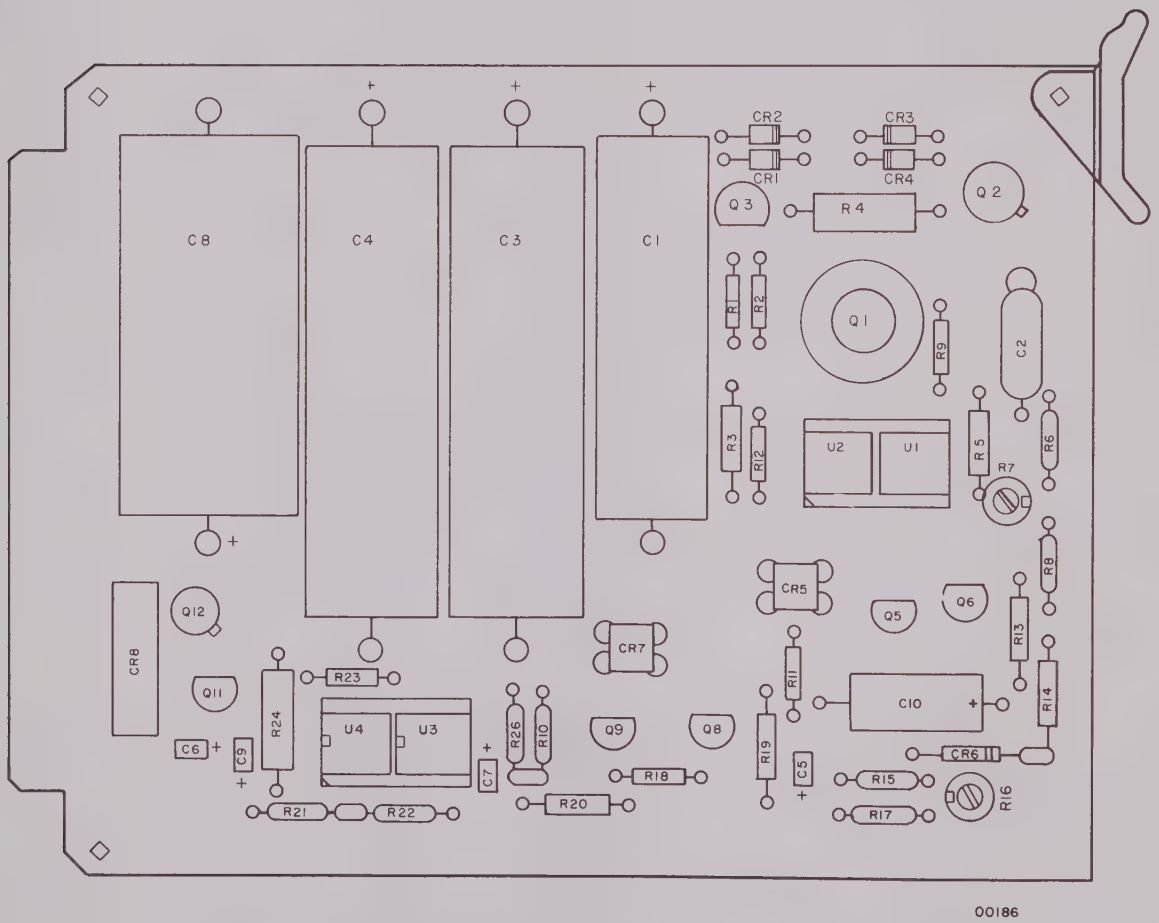


Figure 6—1. Model 2762 Power Supply, A1 (95875), Component Location.

Table 6—6. Model 2762 Power Supply, A1 (95875) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	20UF			350V	SPRAGUE	39D206F350FL4	300002060
C2	.022UF		10%	400V	SPRAGUE	4PS-S22	321202230
C3	1100UF			30V	SPRAGUE	39D118G030GP4	300001180
C4	1100UF			30V	SPRAGUE	39D118G030GP4	300001180
C5	4.7UF		10%	25V	KEMET	T330A475K025AS	310004751
C6	4.7UF		10%	25V	KEMET	T330A475K025AS	310004751
C7	2.2UF		10%	35V	KEMET	T330A225K035AS	310002250
C8	4000UF			15V	SPRAGUE	39D408G015JL4	300004081

Table 6—6. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C9	22UF		10%	6V	KEMET	T330A226K006AS	310002260
C10	100UF			16V	SPRAGUE	TE-1162	300201071
CR1	A38AH			600V	TI	1N2071	560020710
CR2	A38AH			600V	TI	1N2071	560020710
CR3	A38AH			600V	TI	1N2071	560020710
CR4	A38AH			600V	TI	1N2071	560020710
CR5	4 DIODE FULL WAVE				MOTOROLA	MDA920-A2	565009202
CR6	DO-7	250MW	5%	6.2V	DICKSON	1N823	563008230
CR7	4 DIODE FULL WAVE				MOTOROLA	MDA920-A2	565009202
CR8	4 DIODE FULL WAVE				MOTOROLA	MDA960-1	565009601
Q1	I -1A H 30 GB 15MHZ				RCA	2N5416	552054160
Q2	TO5	10W		350V	RCA	2N3439	550034390
Q3	TO92MSS	310MW		40V	MOTOROLA	2N3905	552039050
Q5	TO92HSS	310MW		40V	MOTOROLA	2N3903	550039030
Q6	TO92HSS	310MW		40V	MOTOROLA	2N3903	550039030
Q8	TO92MSS	310MW		40V	MOTOROLA	2N3905	552039050
Q9	TO92MSS	310MW		40V	MOTOROLA	2N3905	552039050
Q11	TO92HSS	310MW		40V	MOTOROLA	2N3903	550039030
Q12	TO5HNS	1W		65V	RCA	2N2102	550021020
R1	10-	1/4W	10%		AB	TYPE CB	200101006
R2	1.8K	1/4W	10%		AB	TYPE CB	200101826
R3	820K	1/2W	10%		AB	TYPE EB	200208246
R4	120K	1W	5%		OHMITE	LITTLE DEVIL	200701245
R5	8.2K	1/2W	10%		AB	TYPE EB	200208226
R6	511K	1/4W	1%		ELECTRA	RN60 SIZE 100 PPM	220551131
R7	2K	1/2W	10%	200V	HELIPOT	62PR2K	232702026
R8	23.7K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220223721
R9	1M	1/4W	10%		AB	TYPE CB	200101056
R10	7150-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220271511
R11	47K	1/4W	10%		AB	TYPE CB	200104736
R12	2.7K	1/4W	10%		AB	TYPE CB	200102726
R13	1-	1/2W	10%		AB	TYPE EB	200200106
R14	1.2K	1/2W	10%		AB	TYPE EB	200201226
R15	5110-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220251111
R16	1K	1/2W	10%	200V	HELIPOT	62PR1K	232701026
R17	5.62K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220256211
R18	2.7K	1/4W	10%		AB	TYPE CB	200102726
R19	1-	1/2W	10%		AB	TYPE EB	200200106
R20	1.2K	1/2W	10%		AB	TYPE EB	200201226
R21	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R22	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R23	2.7K	1/4W	10%		AB	TYPE CB	200102726
R24	.18-	2W	5%		IRC	BWH	210201885
R25	5110-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220251111
U1	8PDIL	OOMW		180	SIGNETICS	UA741CV	500057410
U2	8PDIL	OOMW		180	SIGNETICS	UA741CV	500057410
U3	8PDIL	OOMW		180	SIGNETICS	UA741CV	500057410
U4	8PDIL	OOMW		180	SIGNETICS	UA741CV	500057410
XU1-2	SKT IC 16P PC				AUGAT	316-AG5D-2R	820100400

Table 6—7. Model 2762 Transformer Assembly Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
J18	22PIN DUAL EYELET				AMPHENOL	225-22221-101	651701000
Q4	LPA	25W		40V	MOTOROLA	2N4910	550049100
Q7	LPA	25W		40V	MOTOROLA	2N4898	552048980
Q10	TO3LPA	115W		60V	RCA	2N3055	550030550
T1	P115 S 6@9 1@200				PRECISION	NEC4A	420200600

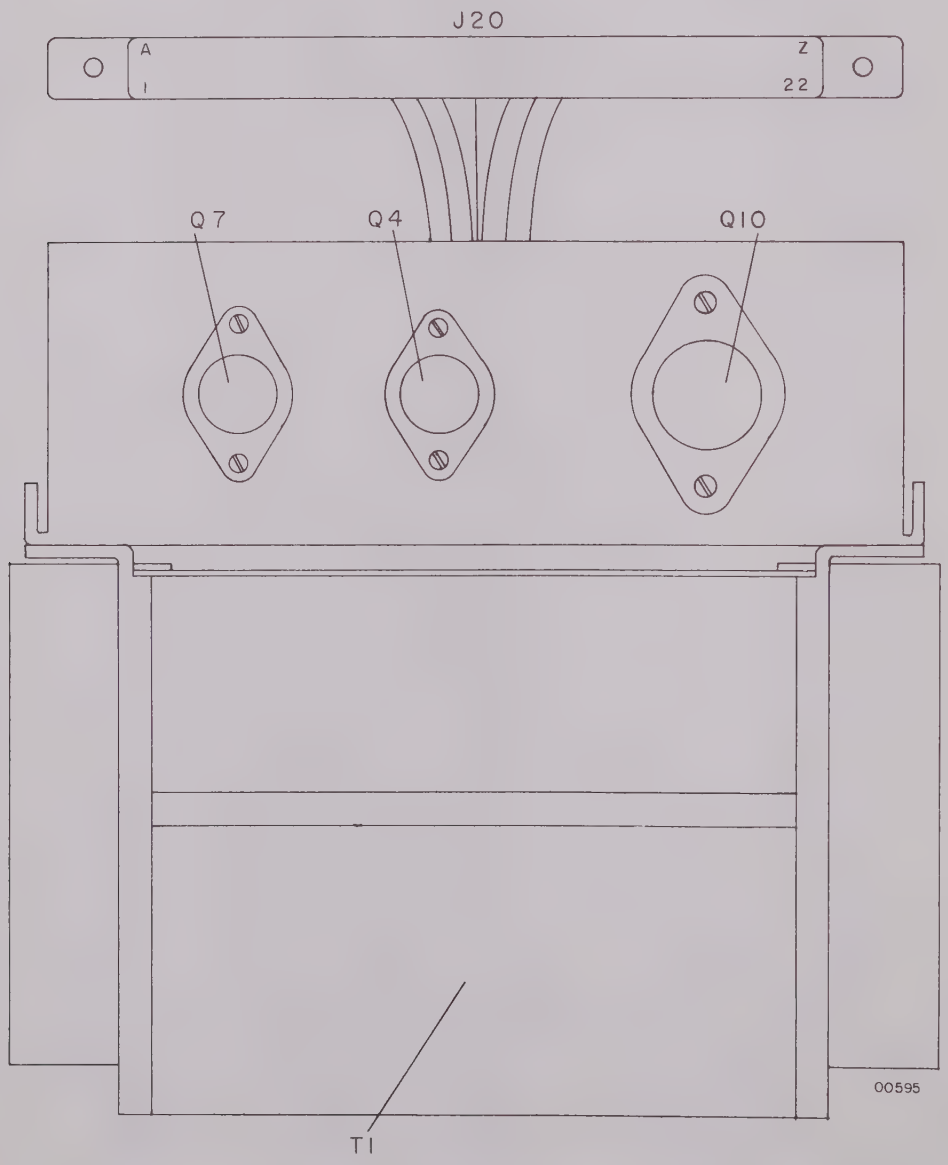


Figure 6—2. Model 2762 Transformer Assembly Component Location.

Table 6—8. Model 2762 MF Input (AGC), A2 (95883) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	.01UF		10%	100V	SPRAGUE	225P10391WD3	320C01030
C2	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C3	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C4	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C5	1UF		10%	35V	KEMET	T330A105KC35AS	310001051
C6	15UF		10%	10V	KEMET	T330A156K010AS	310001560
C7	.22UF		10%	50V	KEMET	T330A224KC50AS	31C002240
C8	10UF		10%	10V	KEMET	T330A106K010AS	310001060
C9	10UF		10%	10V	KEMET	T330A106K010AS	310001060
C10	10UF		10%	10V	KEMET	T330A106K010AS	310001060
C11	22PF	S2LTC	10%	1KV	CENTRALAB	CD-220	330C02200
CR1-3	D035	500MW		75V	FAIRCHILD	1N4148	56C041480
Q1	TO92	1-5MA		250	MOTOROLA	MPF103 2N5457	554C01030
Q2	TO92	TO 92		400V	MOTOROLA	MPF152 2N5461	555001520
Q3	TO92	1-5MA		250	MOTOROLA	MPF103 2N5457	554001030
R1	38.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238321
R2	75K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220275021
R3	22K	1/4W	10%		AB	TYPE CB	200102236
R4	1K	1/4W	10%		AB	TYPE CB	200101026
R5	38.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238321
R6	75K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220275021
R7	22K	1/4W	10%		AB	TYPE CB	200102236
R8	1K	1/4W	10%		AB	TYPE CB	200101026
R9	3.9K	1/4W	10%		AB	TYPE CB	200103926
R10	1.8K	1/4W	10%		AB	TYPE CB	200101826
R11	100K	1/4W	10%		AB	TYPE CB	200101046
R12	10K	1/4W	10%		AB	TYPE CB	200101036
R13	47K	1/4W	10%		AB	TYPE CB	200104736
R14	47K	1/4W	10%		AB	TYPE CB	200104736
R15	10-	1/4W	10%		AB	TYPE CB	200101006
R16	1.5M	1/4W	10%		AB	TYPE CB	200101556
R17	1.5K	1/4W	10%		AB	TYPE CB	200101526
R18	3.3K	1/4W	10%		AB	TYPE CB	200103326
R19	1.5K	1/4W	10%		AB	TYPE CB	200101526
R20	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R21	6.8K	1/4W	10%		AB	TYPE CB	200106826
R22	2.2K	1/4W	10%		AB	TYPE CB	200102226
R23	120-	1/4W	10%		AB	TYPE CB	200101216
R24	1K	1/4W	10%		AB	TYPE CB	200101026
R25	120-	1/4W	10%		AB	TYPE CB	200101216
R26	2.2K	1/4W	10%		AB	TYPE CB	200102226
R27	2.2K	1/4W	10%		AB	TYPE CB	200102226
R28	3.3K	1/4W	10%		AB	TYPE CB	200103326
R29	1.5K	1/4W	10%		AB	TYPE CB	200101526
R30	1.5K	1/4W	10%		AB	TYPE CB	200101526
R31	27K	1/4W	10%		AB	TYPE CB	200102736
R32	4.7M	1/4W	10%		AB	TYPE CB	200104756
R33	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R34	22K	1/4W	10%		AB	TYPE CB	200102236
R35	3.9M	1/4W	10%		AB	TYPE CB	200103956
R36	100K	1/4W	10%		AB	TYPE CB	200101046

Table 6—8. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.G. PART NO.
R37	470-	1/4W	10%		AB	TYPE CB	2CC104716
SV1	SILICON				SCHAUER	SV-1	56551CCC0
U1	8PDIL	80MW		18C	SIGNETICS	N5558V	5CC055580
U2	8PDIL	80MW		18C	SIGNETICS	N5558V	5CC055580
U3	2PTC5M				RCA	CA3026	5CC030260
XC1-3	SKT				ELCO	05-3303	826600100
XU1	SKT IC 16P PC				AUGAT	316-AG5D-2R	82C100400
XU2	SKT IC 12P PC TC5 TEFLON				AUGAT	8058-1G55	820200200

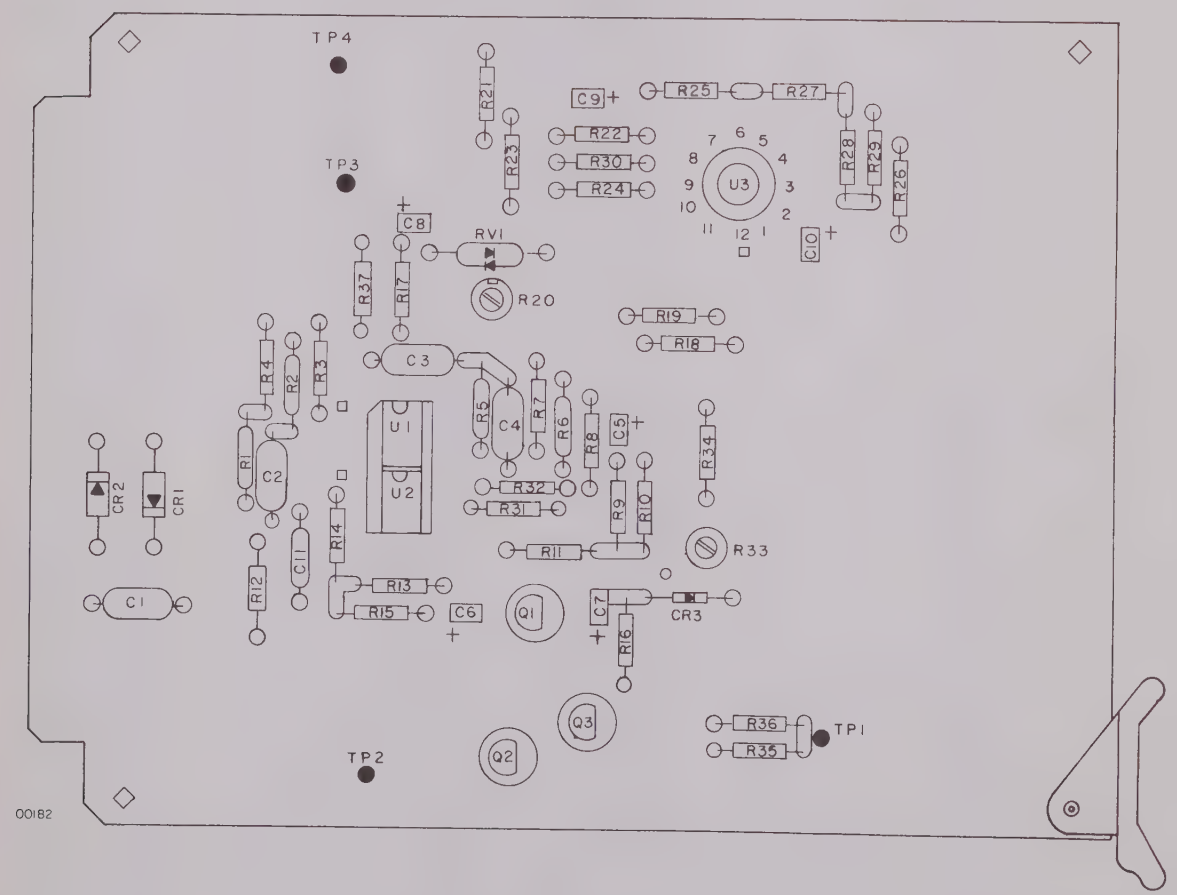


Figure 6—3. Model 2762 MF Input (AGC), A2 (95883), Component Location.

Table 6—9. Model 2762 Dual MF Input (AGC), A2 (96588) for Options 4 and 5 Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1-4	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C5	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C6	15UF		10%	10V	KEMET	T330A156K010AS	310001560
C7	22PF	S2LTC	10%	1KV	CENTRALAB	CD-220	330002200
C8	.22UF		10%	50V	KEMET	T330A224K050AS	310002240
C9-11	10UF		10%	10V	KEMET	T330A106K010AS	310001060
C12-15	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C16	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C17	15UF		10%	10V	KEMET	T330A156K010AS	310001560
C18	22PF	S2LTC	10%	1KV	CENTRALAB	CD-220	330002200
C19	.22UF		10%	50V	KEMET	T330A224K050AS	310002240
C20-22	10UF		10%	10V	KEMET	T330A106K010AS	310001060
CR1-6	DO35	500MW		75V	FAIRCHILD	1N4148	560041480
Q1	TO92	1-5MA		250	MOTOROLA	MPF103 2N5457	554001030
Q2	TO92	TO 92		400V	MOTOROLA	MPF152 2N5461	555001520
Q3-4	TO92	1-5MA		250	MOTOROLA	MPF103 2N5457	554001030
Q5	TO92	TO 92		400V	MOTOROLA	MPF152 2N5461	555001520
Q6	TO92	1-5MA		250	MOTOROLA	MPF103 2N5457	554001030
R1	38.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238321
R2	75K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220275021
R3	22K	1/4W	10%		AB	TYPE CB	200102236
R4	1K	1/4W	10%		AB	TYPE CB	200101026
R5	38.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238321
R6	75K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220275021
R7	22K	1/4W	10%		AB	TYPE CB	200102236
R8	1K	1/4W	10%		AB	TYPE CB	200101026
R9	3.9K	1/4W	10%		AB	TYPE CB	200103926
R10	1.8K	1/4W	10%		AB	TYPE CB	200101826
R11	10K	1/4W	10%		AB	TYPE CB	200101036
R12	100K	1/4W	10%		AB	TYPE CB	200101046
R13-14	47K	1/4W	10%		AB	TYPE CB	200104736
R15	1.5K	1/4W	10%		AB	TYPE CB	200101526
R16	470-	1/4W	10%		AB	TYPE CB	200104716
R17	10-	1/4W	10%		AB	TYPE CB	200101006
R18	1.5M	1/4W	10%		AB	TYPE CB	200101556
R19	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R20	3.3K	1/4W	10%		AB	TYPE CB	200103326
R21-22	1.5K	1/4W	10%		AB	TYPE CB	200101526
R23	2.2K	1/4W	10%		AB	TYPE CB	200102226
R24	3.3K	1/4W	10%		AB	TYPE CB	200103326
R25	2.2K	1/4W	10%		AB	TYPE CB	200102226
R26	120-	1/4W	10%		AB	TYPE CB	200101216
R27	1K	1/4W	10%		AB	TYPE CB	200101026
R28	1.5K	1/4W	10%		AB	TYPE CB	200101526
R29	120-	1/4W	10%		AB	TYPE CB	200101216
R30	2.2K	1/4W	10%		AB	TYPE CB	200102226
R31	6.8K	1/4W	10%		AB	TYPE CB	200106826
R32	27K	1/4W	10%		AB	TYPE CB	200102736
R33	4.7M	1/4W	10%		AB	TYPE CB	200104756
R34	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R35	22K	1/4W	10%		AB	TYPE CB	200102236

Table 6—9. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.G. PART NO.
R36	3.9M	1/4W	10%		AB	TYPE CB	200103956
R37	100K	1/4W	10%		AB	TYPE CB	200101046
R38-39	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R40	12.1K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220212121
R41	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R42	38.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238321
R43	75K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220275021
R44	22K	1/4W	10%		AB	TYPE CB	200102236
R45	1K	1/4W	10%		AB	TYPE CB	200101026
R46	38.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238321
R47	75K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220275021
R48	22K	1/4W	10%		AB	TYPE CB	200102236
R49	1K	1/4W	10%		AB	TYPE CB	200101026
R50	3.9K	1/4W	10%		AB	TYPE CB	200103926
R51	1.8K	1/4W	10%		AB	TYPE CB	200101826
R52	10K	1/4W	10%		AB	TYPE CB	200101036
R53	100K	1/4W	10%		AB	TYPE CB	200101046
R54-55	47K	1/4W	10%		AB	TYPE CB	200104736
R56	1.5K	1/4W	10%		AB	TYPE CB	200101526
R57	470-	1/4W	10%		AB	TYPE CB	200104716
R58	10-	1/4W	10%		AB	TYPE CB	200101006
R59	1.5M	1/4W	10%		AB	TYPE CB	200101556
R60	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R61	3.3K	1/4W	10%		AB	TYPE CB	200103326
R62-63	1.5K	1/4W	10%		AB	TYPE CB	200101526
R64	2.2K	1/4W	10%		AB	TYPE CB	200102226
R65	3.3K	1/4W	10%		AB	TYPE CB	200103326
R66	2.2K	1/4W	10%		AB	TYPE CB	200102226
R67	120-	1/4W	10%		AB	TYPE CB	200101216
R68	1K	1/4W	10%		AB	TYPE CB	200101026
R69	1.5K	1/4W	10%		AB	TYPE CB	200101526
R70	120-	1/4W	10%		AB	TYPE CB	200101216
R71	2.2K	1/4W	10%		AB	TYPE CB	200102226
R72	6.8K	1/4W	10%		AB	TYPE CB	200106826
R73	27K	1/4W	10%		AB	TYPE CB	200102736
R74	4.7M	1/4W	10%		AB	TYPE CB	200104756
R75	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R76	22K	1/4W	10%		AB	TYPE CB	200102236
R77	3.9M	1/4W	10%		AB	TYPE CB	200103956
R78	100K	1/4W	10%		AB	TYPE CB	200101046
RV1-2	SILICON				SCHAUER	SV-1	565510000
U1-5	8PDIL	80MW		18V	SIGNETICS	N5558V	500055580
U6-7	2PTO5M				RCA	CA3026	500030260
XQ1-6	SKT				ELCO	05-3303	826600100
XU1	SKT IC 16P PC				AUGAT	316-AG5D-2R	820100400
XU2	SKT IC LOW PROF 8PDIL				AMP	583640-1	820000400
XU3	SKT IC 16P PC				AUGAT	316-AG5D-2R	820100400
XU4-5	SKT IC 12P PC TO5 TEFLON				AUGAT	8058-1G55	820200200

Table 6—9. (cont'd)

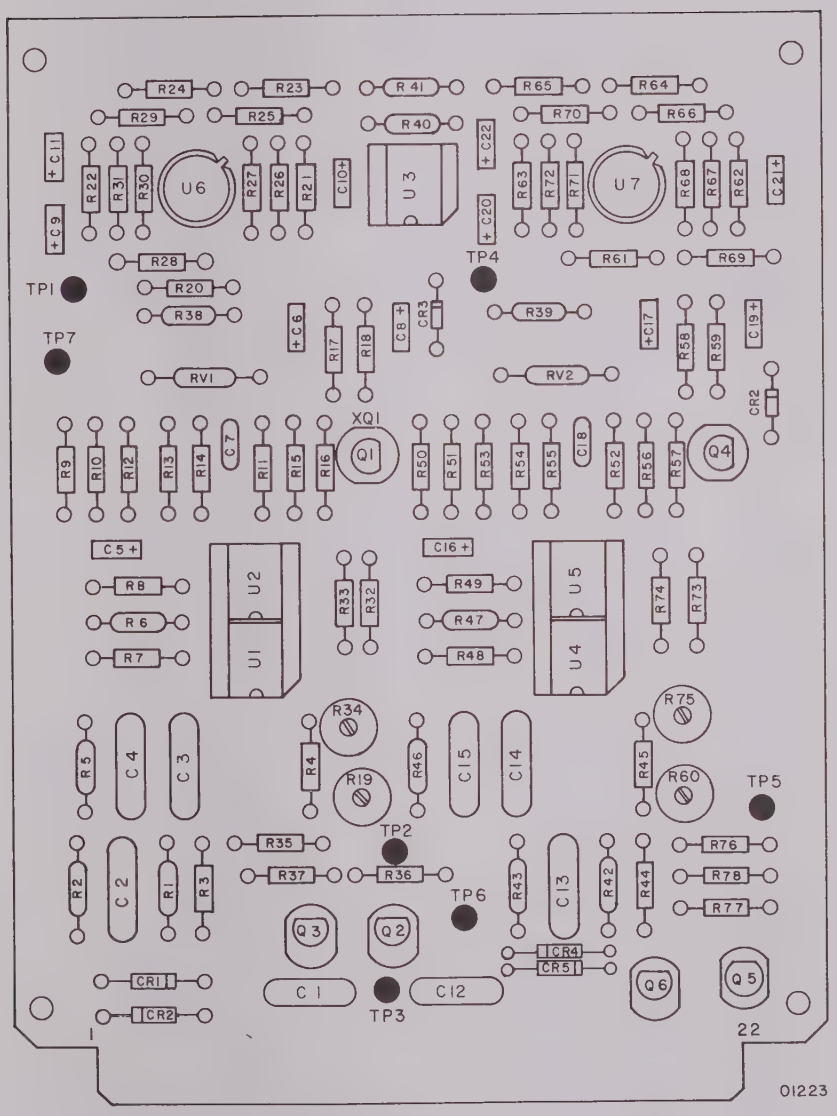


Figure 6—4. Model 2762 Dual MF Input (AGC), A2 (96588) For Options 4 and 5, Component Location.

Table 6—10. Model 2762 Main Input, A3 (96592) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1-2	50UF			16V	SPRAGUE	TE1160	300205C60
C3	.01UF		10%	100V	SPRAGUE	225P10391WD3	32C001030
C4	.022UF		10%	100V	SPRAGUE	225P22391WD3	32CC02230
C5	.0022UF		10%	100V	SPRAGUE	225P22291WD3	32CC02220
C6	.022UF		10%	100V	SPRAGUE	225P22391WD3	32CC02230
C7	.022UF		10%	100V	SPRAGUE	225P22391WD3	32CC02230
C8	.0022UF		10%	100V	SPRAGUE	225P22291WD3	32CC02220
C9	.022UF		10%	100V	SPRAGUE	225P22391WD3	32CC02230
C10	1UF		10%	35V	KEMET	T330A105K035AS	31CCC1051
C11-12	.047UF		10%	100V	SPRAGUE	225P47391WD3	32CC04730
C13	1.0UF	Y5V	TC 20%	50V	ERIE	8131-050-651-105M	330801C50
C14	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C15	.CC1UF		10%	100V	SPRAGUE	225P10291WD3	32CC01020
C16	20UF			15V	TSI	PA20HH15NP	301302060
CR1-11	DO35	500MW		75V	FAIRCHILD	1N4148	56CC41480
F1	1/8A				LITTELFUSE	275.125	8632CC9C0
K1	1A PC MINI				D. RANDALL	377025	6041013C0
Q1	TO92	1-5MA		25V	MOTOROLA	MPF103 2N5457	554001030
Q2	TO92 TO 92			40V	MOTOROLA	MPF152 2N5461	555001520
Q3-4	TO92HSS	310MW		40V	MOTOROLA	2N3903	55C039030
Q5	TO5HNS	1W		65V	RCA	2N2102	55C021020
Q6	TO5MSS	5W		65V	RCA	2N4036	552040360
Q7-8	TO92HSS	310MW		40V	MOTOROLA	2N3903	55C039030
Q9-10	TO92	1-5MA		25V	MOTOROLA	MPF103 2N5457	554001030
R1	5110-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220251111
R2-3	162-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220216201
R4	5110-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220251111
R5-6	16.2K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220216221
R7	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R8	22K	1/4W	10%		AB	TYPE CB	200102236
R9-10	1M	1/4W	10%		AB	TYPE CB	200101056
R11-14	10K	1/4W	10%		AB	TYPE CB	200101036
R15	17.8K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220217821
R16	383K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238331
R17	4.7K	1/4W	10%		AB	TYPE CB	200104726
R18	18K	1/4W	10%		AB	TYPE CB	200101836
R19	3.3K	1/4W	10%		AB	TYPE CB	200103326
R20	22K	1/4W	10%		AB	TYPE CB	200102236
R21	4.7K	1/4W	10%		AB	TYPE CB	200104726
R22	17.8K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220217821
R23	383K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220238331
R24	4.7K	1/4W	10%		AB	TYPE CB	200104726
R25	18K	1/4W	10%		AB	TYPE CB	200101836
R26	3.3K	1/4W	10%		AB	TYPE CB	200103326
R27	47K	1/4W	10%		AB	TYPE CB	200104736
R28	22K	1/4W	10%		AB	TYPE CB	200102236
R29-30	39-	1/2W	5%		AB	TYPE EB	200203905
R31	3.3K	1/4W	10%		AB	TYPE CB	200103326
R32	1.8K	1/4W	10%		AB	TYPE CB	200101826

Table 6—10. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R33	8.2K	1/4W	10%		AB	TYPE CB	200108226
R34	4.7K	1/4W	10%		AB	TYPE CB	200104726
R35	10K	1/4W	10%		AB	TYPE CB	200101036
R36-37	3.3K	1/4W	10%		AB	TYPE CB	200103326
R38	4.7K	1/4W	10%		AB	TYPE CB	200104726
R39	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R40	14.7K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220214721
R41	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R42-43	100K	1/4W	10%		AB	TYPE CB	200101046
R44	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R45	12.4K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220212421
R46-48	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R49	5K	1/2W	10%	200V	HELIPOT	62PR5K	232705026
R50	5110-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220251111
R51	10K	1/2W	10%	200V	HELIPOT	62PR10K	232701036
R52	220-	1/4W	10%		AB	TYPE CB	200102216
R53	22-	1/4W	10%		AB	TYPE CB	200102206
R54	4.7K	1/4W	10%		AB	TYPE CB	200104726
RV1-2	SILICON				SCHAUER	SV-1	565510000
T1-2	P20-30K S800-1200 AUDIO P				UTC	SO-7P	400300100
U1-5	8PDIL	80MW		180	SIGNETICS	N5558V	500055580
XU1-5	SKT IC LOW PROF 8PDIL				AMP	583640-1	820000400

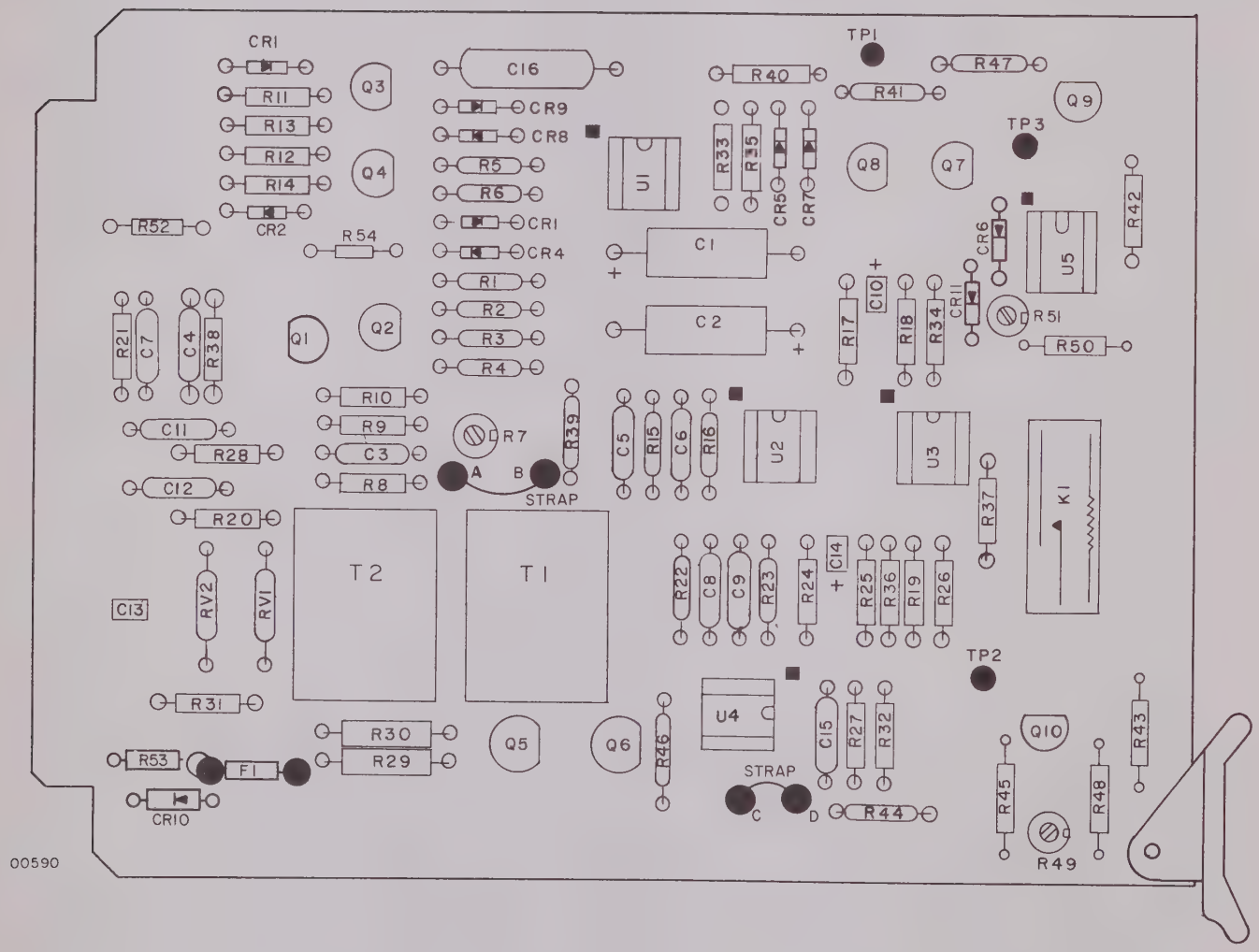


Figure 6—5. Model 2762 Main Input, A3 (96592), Component Location.

Table 6—11. Model 2762 Quad SF (VF) Detector, A4 (96590) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C2-5	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C6	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C7-8	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C9	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C10-13	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C14	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C15-16	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C17	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C18-21	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C22	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C23-24	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C25	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C26-29	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C30	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C31-32	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
CR1-12	D035	500MW		75V	FAIRCHILD	1N4148	560041480
Q1-4	T092HSS	310MW		40V	MOTOROLA	2N3903	550039030
R1	100K	1/4W	10%		AB	TYPE CB	200101046
R2	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R3	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R4-5	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R6-7	6340-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220263411
R8	100K	1/4W	10%		AB	TYPE CB	200101046
R9	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R10	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R11-12	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R13-14	6340-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220263411
R15	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R16	100-	1/4W	10%		AB	TYPE CB	200101016
R17	100K	1/4W	10%		AB	TYPE CB	200101046
R18	1M	1/4W	10%		AB	TYPE CB	200101056
R19-21	100K	1/4W	10%		AB	TYPE CB	200101046
R22	10K	1/4W	10%		AB	TYPE CB	200101036
R23	100K	1/4W	10%		AB	TYPE CB	200101046
R24	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R25	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R26-27	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R28-29	5900-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220259011
R30	100K	1/4W	10%		AB	TYPE CB	200101046
R31	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R32	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R33-34	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R35-36	5.76K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220257611
R37	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R38	100-	1/4W	10%		AB	TYPE CB	200101016
R39	100K	1/4W	10%		AB	TYPE CB	200101046
R40	1M	1/4W	10%		AB	TYPE CB	200101056
R41-43	100K	1/4W	10%		AB	TYPE CB	200101046
R44	10K	1/4W	10%		AB	TYPE CB	200101036
R45	100K	1/4W	10%		AB	TYPE CB	200101046

Table 6—11. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R46	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R47	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R48-49	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R50-51	6340-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220263411
R52	100K	1/4W	10%		AB	TYPE CB	200101046
R53	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R54	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R55-56	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R57-58	6340-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220263411
R59	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R60	100-	1/4W	10%		AB	TYPE CB	200101016
R61	100K	1/4W	10%		AB	TYPE CB	200101046
R62	1M	1/4W	10%		AB	TYPE CB	200101056
R63-65	100K	1/4W	10%		AB	TYPE CB	200101046
R66	10K	1/4W	10%		AB	TYPE CB	200101036
R67	100K	1/4W	10%		AB	TYPE CB	200101046
R68	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R69	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R70-71	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R72-73	5900-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220259011
R74	100K	1/4W	10%		AB	TYPE CB	200101046
R75	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R76	7870-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R77	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R78	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R79-80	5.76K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220257611
R81	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R82	100-	1/4W	10%		AB	TYPE CB	200101016
R83	100K	1/4W	10%		AB	TYPE CB	200101046
R84	1M	1/4W	10%		AB	TYPE CB	200101056
R85-87	100K	1/4W	10%		AB	TYPE CB	200101046
R88	10K	1/4W	10%		AB	TYPE CB	200101036
U1-8	8PDIL	80MW		180	SIGNETICS	N5558V	500055580
XU1-4	SKT IC 16P PC				AUGAT	316-AG5D-2R	820100400

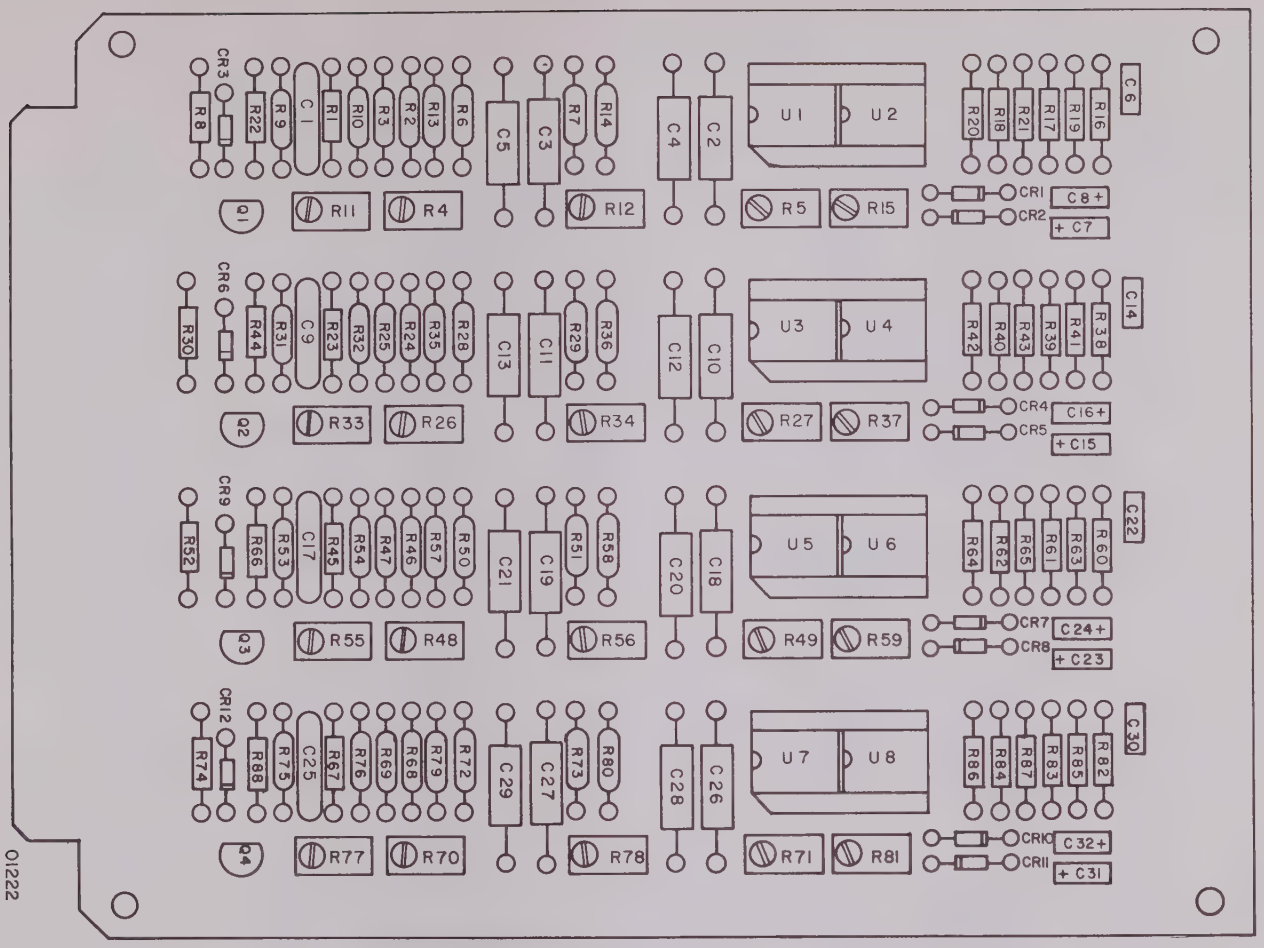


Figure 6—6. Model 2762 Quad SF (VF) Detector, A4 (96590), Component Location.

Table 6—12. Model 2762 Triple MF Selective Detector, A5 (96568) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C2-5	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C6	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C7-8	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C9	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C10-13	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C14	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C15-16	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C17	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C18-21	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C22	1.0UF	Y5V TC	20%	50V	ERIE	8131-050-651-105M	330801050
C23-24	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
CR1-9	DO35	500MW		75V	FAIRCHILD	1N4148	560041480
Q1	TO92AFA	310MW		25V	MOTOROLA	MPS6515	550065150
Q2	TO92AFA	310MW		400V	FAIRCHILD	2N3569	550035690
Q3	TO92AFA	310MW		25V	MOTOROLA	MPS6515	550065150
Q4	TO92AFA	310MW		400V	FAIRCHILD	2N3569	550035690
Q5	TO92AFA	310MW		25V	MOTOROLA	MPS6515	550065150

Table 6—12. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
Q6	TO92AFA	310MW		4COV	FAIRCHILD	2N3569	55C035690
R1	1COK	1/4W	10%		AB	TYPE CB	2CC101046
R2	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R3	787C-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R4-5	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R6-7	23.2K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220223221
R8	1COK	1/4W	10%		AB	TYPE CB	200101046
R9	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R10	787C-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R11-12	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R13-14	21.5K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220221521
R15	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R16	100-	1/4W	10%		AB	TYPE CB	200101016
R17	1M	1/4W	10%		AB	TYPE CB	200101056
R18-21	100K	1/4W	10%		AB	TYPE CB	200101046
R22	220K	1/4W	10%		AB	TYPE CB	200102246
R23	10K	1/4W	10%		AB	TYPE CB	200101036
R24	1COK	1/4W	10%		AB	TYPE CB	200101046
R25	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R26	787C-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R27-28	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R29-30	17.4K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220217421
R31	100K	1/4W	10%		AB	TYPE CB	200101046
R32	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R33	787C-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R34-35	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R36-37	16.9K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220216921
R38	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R39	100-	1/4W	10%		AB	TYPE CB	200101016
R40	1M	1/4W	10%		AB	TYPE CB	200101056
R41-44	100K	1/4W	10%		AB	TYPE CB	200101046
R45	220K	1/4W	10%		AB	TYPE CB	200102246
R46	10K	1/4W	10%		AB	TYPE CB	200101036
R47	100K	1/4W	10%		AB	TYPE CB	200101046
R48	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R49	787C-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R50-51	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R52-53	14.3K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220214321
R54	100K	1/4W	10%		AB	TYPE CB	200101046
R55	4420-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R56	787C-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R57-58	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R59-60	13.7K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220213721
R61	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R62	100-	1/4W	10%		AB	TYPE CB	200101016
R63	1M	1/4W	10%		AB	TYPE CB	200101056
R64-67	100K	1/4W	10%		AB	TYPE CB	200101046
R68	220K	1/4W	10%		AB	TYPE CB	200102246
R69	10K	1/4W	10%		AB	TYPE CB	200101036
U1-6	8PDIL	80MW		18V	SIGNETICS	N5558V	5CC055580
XU1-6	SKT IC LOW PROF 8PDIL				AMP	583640-1	8200004C0

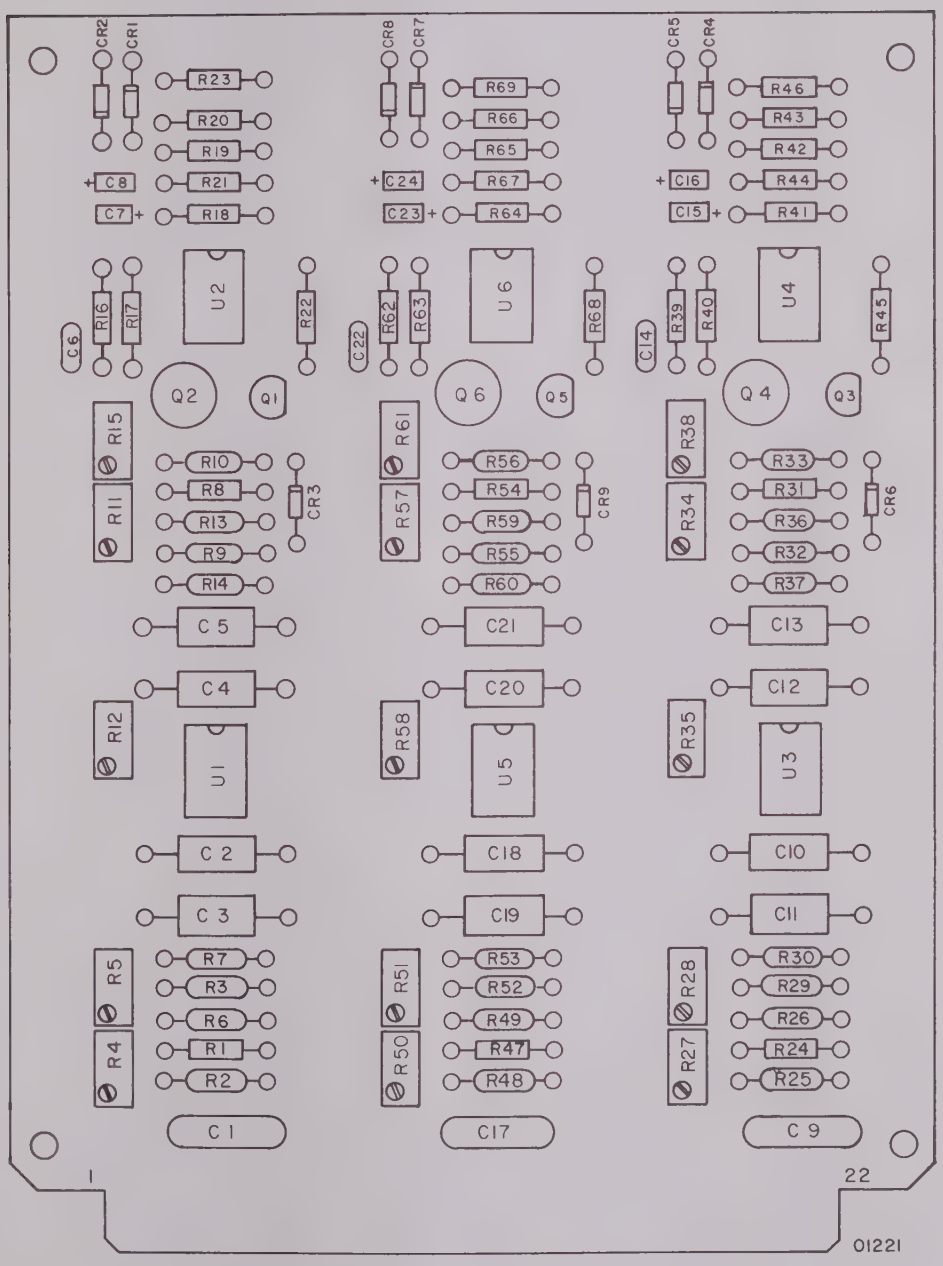


Figure 6—7. Model 2762 Triple MF Selective Detector, A5 and A6 (96568), Component Location.

Table 6—13. Model 2762 Triple MF Selective Detector A6 (96568) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TCL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C2-5	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C6	1.0UF	Y5V	TC 20%	50V	ERIE	8131-050-651-105M	330801050
C7-8	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C9	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C10-13	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C14	1.0UF	Y5V	TC 20%	50V	ERIE	8131-050-651-105M	330801050
C15-16	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C17	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C18-21	.01UF		1%	50V	F-DYNE	PC12-.01-50-1	322201030
C22	1.0UF	Y5V	TC 20%	50V	ERIE	8131-050-651-105M	330801050
C23-24	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
CR1-9	DO35	500MW		75V	FAIRCHILD	1N4148	56C041480
Q1	TO92AFA	310MW		25V	MOTOROLA	MPS6515	55C065150
Q2	TO92AFA	310MW		400V	FAIRCHILD	2N3569	55C035690
Q3	TO92AFA	310MW		25V	MOTOROLA	MPS6515	55C065150
Q4	TO92AFA	310MW		400V	FAIRCHILD	2N3569	55C035690
Q5	TO92AFA	310MW		25V	MOTOROLA	MPS6515	55C065150
Q6	TO92AFA	310MW		400V	FAIRCHILD	2N3569	55C035690
R1	100K	1/4W	10%		AB	TYPE CB	200101046
R2	442O-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R3	787O-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R4-5	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R6-7	12.1K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220212121
R8	100K	1/4W	10%		AB	TYPE CB	200101046
R9	442O-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R10	787O-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R11-12	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R13-14	11.5K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220211521
R15	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R16	100-	1/4W	10%		AB	TYPE CB	200101016
R17	1M	1/4W	10%		AB	TYPE CB	200101056
R18-21	100K	1/4W	10%		AB	TYPE CB	200101046
R22	220K	1/4W	10%		AB	TYPE CB	200102246
R23	10K	1/4W	10%		AB	TYPE CB	200101036
R24	100K	1/4W	10%		AB	TYPE CB	200101046
R25	442O-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R26	787O-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R27-28	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R29-30	10.5K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210521
R31	100K	1/4W	10%		AB	TYPE CB	200101046
R32	442O-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R33	787O-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R34-35	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R36-37	10.2K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210221
R38	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R39	100-	1/4W	10%		AB	TYPE CB	200101016
R40	1M	1/4W	10%		AB	TYPE CB	200101056
R41-44	100K	1/4W	10%		AB	TYPE CB	200101046
R45	220K	1/4W	10%		AB	TYPE CB	200102246
R46	10K	1/4W	10%		AB	TYPE CB	200101036

Table 6—13. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R47	100K	1/4W	10%		AB	TYPE CB	200101046
R48	442Ω	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R49	787Ω	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R50-51	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R52-53	9.31K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220293111
R54	100K	1/4W	10%		AB	TYPE CB	200101046
R55	442Ω	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220244211
R56	787Ω	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220278711
R57-58	1K	1/2W	10%	200V	HELIPOT	66WR1K	232701023
R59-60	8.87K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220288711
R61	20K	1/2W	10%	200V	HELIPOT	66WR20K	232702030
R62	100Ω	1/4W	10%		AB	TYPE CB	200101016
R63	1M	1/4W	10%		AB	TYPE CB	200101056
R64-67	100K	1/4W	10%		AB	TYPE CB	200101046
R68	220K	1/4W	10%		AB	TYPE CB	200102246
R69	10K	1/4W	10%		AB	TYPE CB	200101036
U1-6	8PDIL	80MW		18V	SIGNETICS	NE558V	500055580
XU1-6	SKT IC LOW PROF 8PDIL				AMP	583640-1	820000400

Table 6—14. Model 2762 Error Detector, A7 (96554) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1-2	.47UF		10%	50V	KEMET	T330A474K050AS	31C004741
C3	4.7UF		10%	25V	KEMET	T330A475K025AS	31C004751
C6	10UF		10%	10V	KEMET	T330A106K010AS	31C001060
C7	22UF		10%	6V	KEMET	T330A226K006AS	31C002260
C8-11	.01UF		CO	50V	CENTRALAB	CK-103	330701030
CR1-4	DO35	500MW		75V	FAIRCHILD	1N4148	56C041480
R1	5.6K	1/4W	10%		AB	TYPE CB	200105626
R2	28.7K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220228721
R3	6810-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220268111
R4	21.5K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220221521
R6	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R7	2.7K	1/4W	10%		AB	TYPE CB	200102726
R8	1K	1/4W	10%		AB	TYPE CB	200101026
U1	14DIP				TI	SN7427N	51C074270
U2	14DILP				TI	SN7401N	51C074010
U3	16PDIL				FAIRCHILD	9602PC	510C96025
U4	14DILP				TI	SN74C0N	51C074CC0
U5	16PDIL				FAIRCHILD	9602PC	51CC96025
U6	14DILP				TI	SN74C0N	51C074CC0
U7	14DILP			5C0V	TI	SN7402N	510074020
U10	14DILP				TI	SN7490AN	51C074900
U11	14DILP				TI	SN74C6N	51C074C60
U12	14DILP				TI	SN7406N	51CC74060
U13	16 DILP				TI	SN74174N	51C074174
XU1	SKT IC 16P PC				AUGAT	316-AG5D-2R	820100400

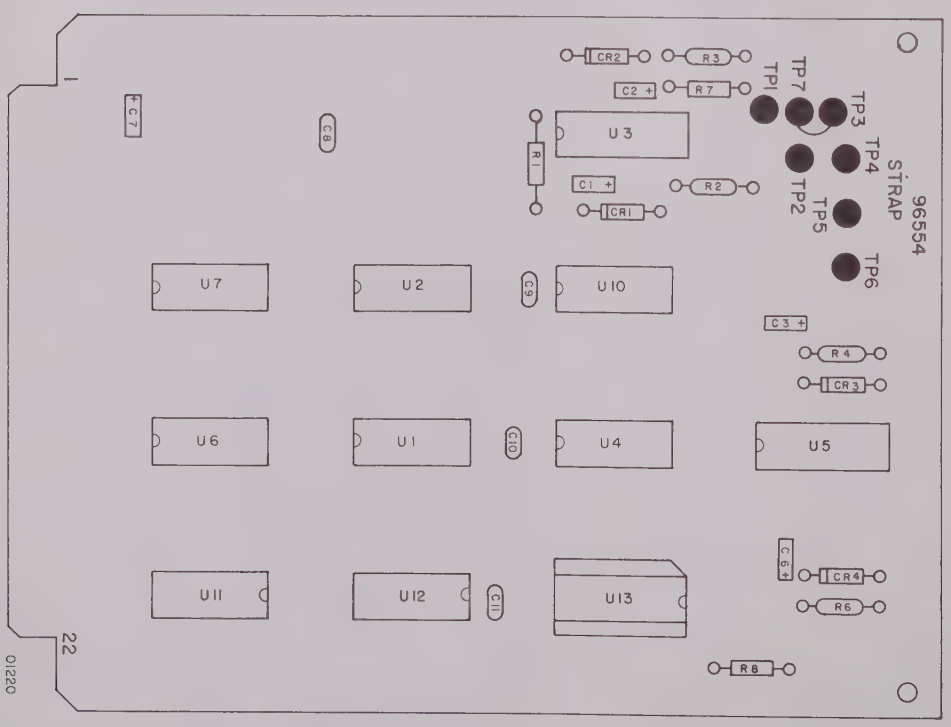


Figure 6—8. Model 2762 Error Detector, A7 (96554), Component Location.

Table 6—15. Model 2762 Error Detector, A7 (96554) for Options 4 and 5 Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	.47UF		10%	50V	KEMET	T330A474K050AS	310004741
C2	.47UF		10%	50V	KEMET	T330A474K050AS	310004741
C3	4.7UF		10%	25V	KEMET	T330A475K025AS	310004751
C4	820PF		5%	100V	ELMENCO	CM15-E821J	335008210
C5	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C6	10UF		10%	10V	KEMET	T330A106K010AS	310001060
C7	22UF		10%	6V	KEMET	T330A226K006AS	310002260
C8-11	.01UF		CO	50V	CENTRALAB	CK-103	330701030
CR1-4	DO35	500MW		75V	FAIRCHILD	1N4148	560041480
R1	5.6K	1/4W	10%		AB	TYPE CB	200105626
R2	28.7K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220228721
R3	6810-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220268111
R4	21.5K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220221521
R5	68.1K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220268121
R6	10K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210021
R7	2.7K	1/4W	10%		AB	TYPE CB	200102726
R8	1K	1/4W	10%		AB	TYPE CB	200101026
U1	14DIP				TI	SN7427N	510074270
U2	14DILP				TI	SN74C1N	510074010
U3	16PDIL				FAIRCHILD	9602PC	510096025
U4	14DILP				TI	SN74C0N	510074C00
U5	16PDIL				FAIRCHILD	9602PC	510096025
U6	14DILP				TI	SN7400N	510074000
U7	14DILP			500V	TI	SN7402N	510074020
U8	8DILP			5-15	SIGNETICS	SE555V	510000555
U9	14DILP				TI	SN7472N	510074720
U10	14DILP				TI	SN7490AN	510074900
U11	14DILP				TI	SN7406N	510074060
U12	14DILP				TI	SN7406N	510074060
U13	16 DILP				TI	SN74174N	510074174
XU1	SKT IC 16P PC				AUGAT	316-AG5D-2R	820100400
XU2	SKT IC LOW PROF 8PDIL				AMP	583640-1	820000400

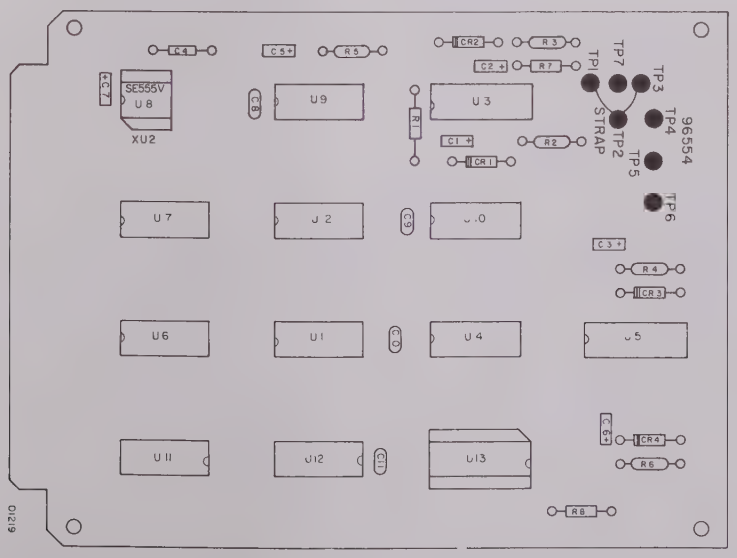


Figure 6—9. Model 2762 Error Detector, A7 (96554) for Options 4 and 5, Component Location.

Table 6—16. Model 2762 MF Decoder A8 (95874) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R1	2.2K	1/4W	10%		AB	TYPE CB	200102226
R2	2.2K	1/4W	10%		AB	TYPE CB	200102226
R3	2.2K	1/4W	10%		AB	TYPE CB	200102226
R4	2.2K	1/4W	10%		AB	TYPE CB	200102226
R5	2.2K	1/4W	10%		AB	TYPE CB	200102226
R6	2.2K	1/4W	10%		AB	TYPE CB	200102226
R7	10K	1/4W	10%		AB	TYPE CB	200101036
U1	14DILP				MOTOROLA	MC9718P	512097180
U2	14DILP				SIGNETICS	SP377A	510003770
U3	14DILP				SIGNETICS	SP377A	510003770
U4	14DILP				SIGNETICS	SP377A	510003770
U5	14DILP				SIGNETICS	SP377A	510003770
U6	14DILP				SIGNETICS	SP377A	510003770
U7	14DILP				SIGNETICS	SP384A	510003840
U8	14DILP				SIGNETICS	SP384A	510003840
U9	14DILP				SIGNETICS	SP384A	510003840
U10	14DILP				SIGNETICS	SP384A	510003840
U11	14DILP				TI	SN7430N	510074300
U12	14DILP				TI	SN7420N	510074200
U13	14DILP				TI	SN7400N	510074000
U14	14DILP				SIGNETICS	SP314A	510003140
U15	14PDIL				TI	SN7403N	510074030

Table 6—17. Model 2762 MF Decoder Options 4 and 5, A8 (95874) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R1-6	2.2K	1/4W	10%		AB	TYPE CB	200102226
R7	10K	1/4W	10%		AB	TYPE CB	200101036
U1	14DILP				MOTOROLA	MC9718P	512C97180
U2-6	14DILP				SIGNETICS	SP377A	51C003770
U7-10	14DILP				SIGNETICS	SP384A	51C003840
U11	14DILP				TI	SN7430N	51C074300
U12	14DILP				TI	SN7420N	51C074200
U13	14DILP				TI	SN74C0N	5100740C0
U14	14DILP				SIGNETICS	SP314A	51C003140
U15	14PDIL				TI	SN7403N	510074030

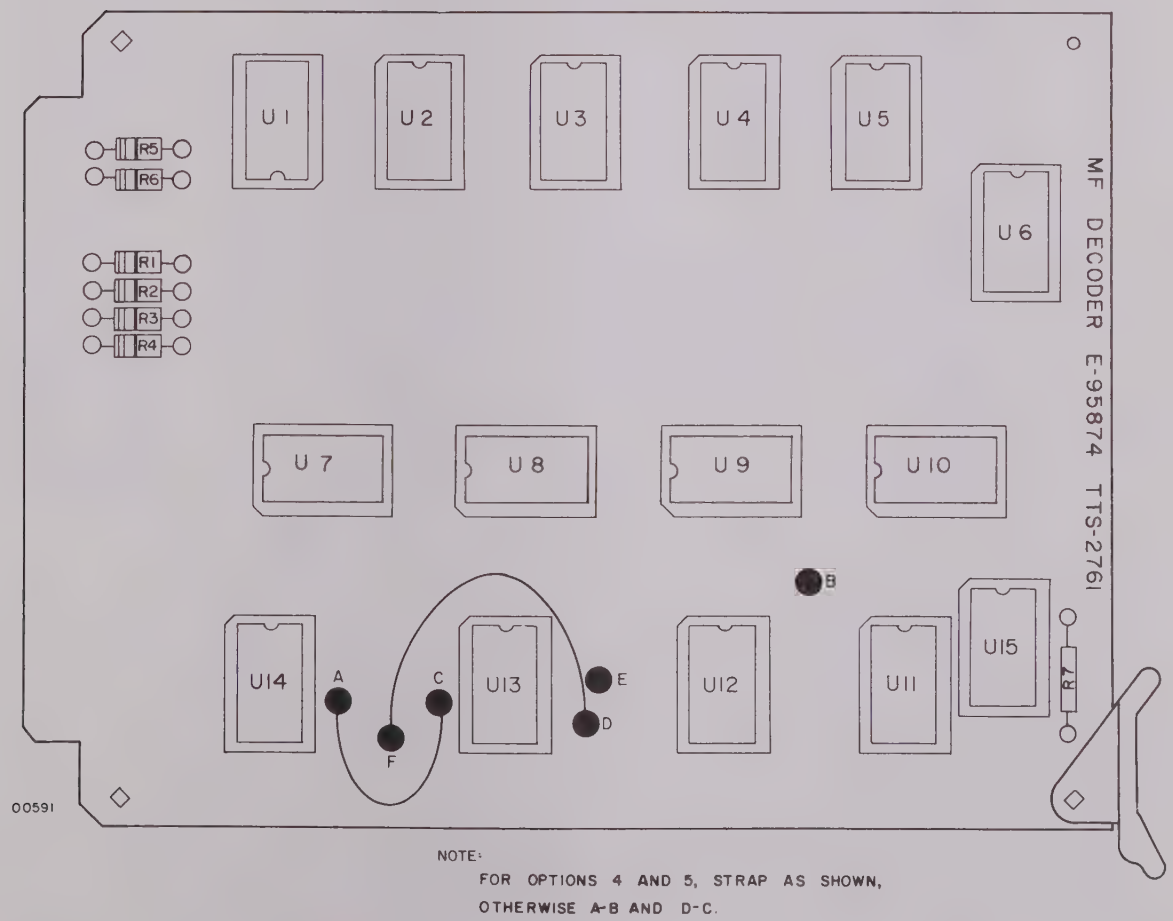


Figure 6—10. Model 2762 MF Decoder, A8 (95874), Component Location.

Table 6—18. Model 2762 Register, A9 (96591) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1-2	SEL VAL				KEMET	T330A	31CCCCCC0
C3	1CCCPF	Z5RTC	10%	1KV	CENTRALAB	CD-1C2	33C001020
C4	.1UF	W5RTC	10%	50V	USCC	CW30C104K	330801041
C5	1CCCPF	Z5RTC	10%	1KV	CENTRALAB	CD-1C2	33C01C20
C6	4.7UF		10%	25V	KEMET	T330A475K025AS	31CC04751
C7	4.7UF		10%	25V	KEMET	T330A475K025AS	310004751
C8	22UF		10%	6V	KEMET	T330A226K006AS	31C002260
C9-12	.01UF		20%	16V	CENTRALAB	UK16-103	330701031
CR1-2	DO35	500MW		75V	FAIRCHILD	1N4148	56C041480
Q1-3	TO92AFA	310MW		25V	MOTCRCLA	MPS6515	550065150
R1	28.7K	1/8W	1%		ELECTRA	RN55 SIZE 1CC PPM	22C228721
R2	10K	1/4W	10%		AB	TYPE CB	2C0101036
R3	4.7K	1/4W	10%		AB	TYPE CB	2CC1C4726
R4	31.6K	1/8W	1%		ELECTRA	RN55 SIZE 1CC PPM	22C231621
R5	10K	1/4W	10%		AB	TYPE CB	2CC101036
R6	470-	1/4W	10%		AB	TYPE CB	2C0104716
R7	4.7K	1/4W	10%		AB	TYPE CB	2C0104726
R8	1CK	1/8W	1%		ELECTRA	RN55 SIZE 1CC PPM	22021C021
R9	4.7K	1/4W	10%		AB	TYPE CB	2CC1C4726
R10-11	19.6K	1/8W	1%		ELECTRA	RN55 SIZE 1C0 PPM	22C219621
R12	18K	1/4W	10%		AB	TYPE CB	2C0101836
R13	3.3K	1/4W	10%		AB	TYPE CB	2CC103326
U1	DIL				TI	SN7413N14P	51CC74130
U2	16DILP				TI	SN74123N	51C074123
U3	14DILP				TI	SN74121N	51C074121
U4	14DIP				TI	SN7404N	51CC74040
U5	14DILP				SIGNETICS	SP314A	51C003140
U6	14DILP				TI	SN7401N	51C074C10
U7	16DILP				TI	SN74123N	51C074123
U8-9	14DILP				TI	SN7474N	51C074740
U10	14DILP				TI	SN7401N	51C074010
XU1	14PDIL				AMP	583527 1	82010C3C0
XU2-3	SKT IC 16P PC				AUGAT	316-AG5D-2R	820100400

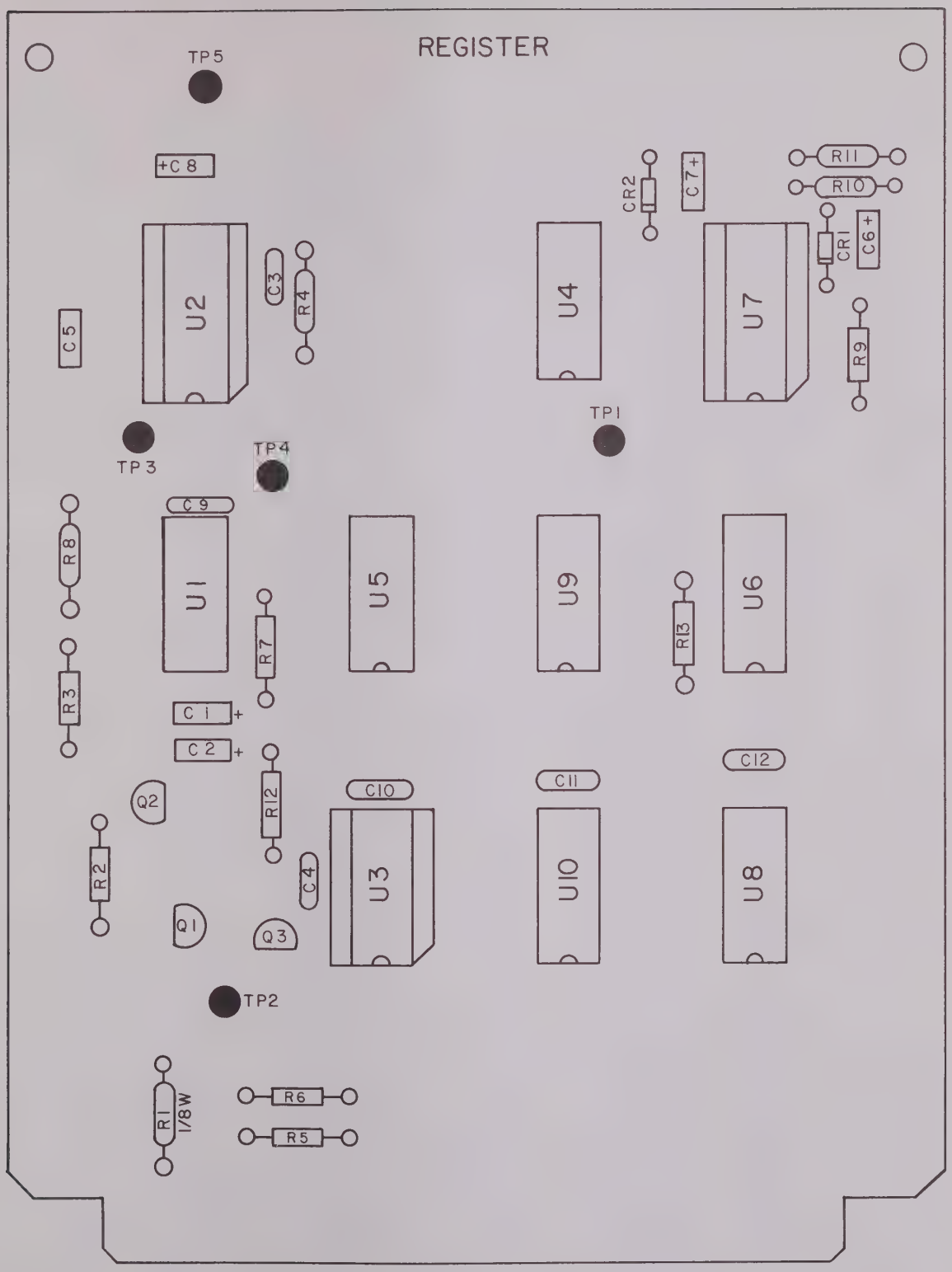


Figure 6—11. Model 2762 Register, A9 (96591), Component Location.

Table 6—19. Model 2762 DC Input, A10 (96073) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1-2	.015UF		10%	100V	SPRAGUE	225P15391WD3	320001530
C3	.1UF		10%	100V	SPRAGUE	225P10491WD3	320001040
C4	.0047UF		10%	100V	SPRAGUE	225P47291WD3	320004720
C5	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C6	.1UF		10%	50V	KEMET	T330A104K050AS	310001040
C7	.01UF	Z5UTC	GMV	1KV	CENTRALAB	CD-103	330101030
C8	4.7UF		10%	25V	KEMET	T330A475K025AS	310004751
C10	.27UF		10%	35V	KEMET	T330A274K035AS	310002740
C11	1UF		10%	35V	KEMET	T330A105K035AS	310001051
C12	4.7UF		10%	25V	KEMET	T330A475K025AS	310004751
C13	.01UF		10%	100V	SPRAGUE	225P10391WD3	320001030
C14	220PF	Z5FTC	10%	1KV	CENTRALAB	CD-221	330002210
C15	15UF		10%	10V	KEMET	T330A156K010AS	310001560
C16-17	8.2UF		10%	15V	KEMET	T330A825K015AS	310008250
C18	22UF		10%	6V	KEMET	T330A226K006AS	310002260
CR1-17	DO35	500MW		75V	FAIRCHILD	1N4148	560041480
Q1-2	TO92AFA	310MW		25V	MOTOROLA	MPS6515	550065150
Q3-4	TO92AFA	310MW		4V	MOTOROLA	MPS6518	550065180
Q5	TO92AFA	310MW		25V	MOTOROLA	MPS6515	550065150
Q6	TO92AFA	310MW		4V	MOTOROLA	MPS6518	550065180
Q7-9	TO92AFA	310MW		25V	MOTOROLA	MPS6515	550065150
Q10	TO92HSS	310MW		40V	MOTOROLA	2N3903	550039030
R1-2	470K	1/4W	10%		AB	TYPE CB	200104746
R3	2K	1/2W	10%	200V	HELIPOT	62PR2K	232702026
R4	3320-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220233211
R5-6	287K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220228731
R7	100K	1/4W	10%		AB	TYPE CB	200101046
R8	3320-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220233211
R9	9090-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220290911
R10	10K	1/4W	10%		AB	TYPE CB	200101036
R11-12	220K	1/4W	10%		AB	TYPE CB	200102246
R13	1M	1/4W	10%		AB	TYPE CB	200101056
R14	4.7M	1/4W	10%		AB	TYPE CB	200104756
R15-16	100K	1/4W	10%		AB	TYPE CB	200101046
R17	10K	1/4W	10%		AB	TYPE CB	200101036
R18	100K	1/4W	10%		AB	TYPE CB	200101046
R19	10K	1/4W	10%		AB	TYPE CB	200101036
R20	220K	1/4W	10%		AB	TYPE CB	200102246
R21	100K	1/4W	10%		AB	TYPE CB	200101046
R22-24	10K	1/4W	10%		AB	TYPE CB	200101036
R25	82-	1/4W	10%		AB	TYPE CB	200108206
R26	5.6K	1/4W	10%		AB	TYPE CB	200105626
R27	33K	1/4W	10%		AB	TYPE CB	200103336
R28	59K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220259021
R29	82K	1/4W	10%		AB	TYPE CB	200108236
R30	158K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220215831
R31	267K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220226731
R32	27K	1/4W	10%		AB	TYPE CB	200102736
R33	150K	1/4W	5%		AB	TYPE CB	200101545
R34	261K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220226131
R35	133K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220213331

Table 6—19. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
R36	82K	1/4W	10%		AB	TYPE CB	2C0108236
R37	22K	1/4W	10%		AB	TYPE CB	200102236
R38-39	10K	1/4W	10%		AB	TYPE CB	2C0101036
R40	19.1K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220219121
R41	10K	1/4W	10%		AB	TYPE CB	2C0101036
R42	100K	1/4W	10%		AB	TYPE CB	200101046
R43	27K	1/4W	10%		AB	TYPE CB	200102736
R44	180K	1/4W	10%		AB	TYPE CB	2001C1846
R45	82-	1/4W	10%		AB	TYPE CB	2C0108206
R46	237K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220223731
R47-48	100K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210031
R49	3.92K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220239211
R50	909C-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220290911
R51	100K	1/4W	10%		AB	TYPE CB	200101046
R52	27K	1/4W	10%		AB	TYPE CB	200102736
R53	10K	1/4W	10%		AB	TYPE CB	2C0101036
R54	2.2K	1/4W	10%		AB	TYPE CB	200102226
R55	4.7K	1/4W	10%		AB	TYPE CB	200104726
R56	15.8K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220215821
R57	10K	1/4W	10%		AB	TYPE CB	2C0101036
R58	100K	1/4W	10%		AB	TYPE CB	200101046
R59	10K	1/4W	10%		AB	TYPE CB	2C0101036
R60	180K	1/4W	10%		AB	TYPE CB	200101846
R61	47K	1/4W	10%		AB	TYPE CB	200104736
R62	68-	1/4W	10%		AB	TYPE CB	200106806
R63	100K	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	220210031
R64	1K	1/4W	10%		AB	TYPE CB	2C0101026
R65-66	3.9K	1/4W	10%		AB	TYPE CB	200103926
R67	464-	1/8W	1%		ELECTRA	RN55 SIZE 100 PPM	2202464C1
R68	3.3K	1/4W	10%		AB	TYPE CB	200103326
R69	2.2K	1/4W	10%		AB	TYPE CB	200102226
R70	3.9K	1/4W	10%		AB	TYPE CB	200103926
R71	2.2K	1/4W	10%		AB	TYPE CB	200102226
R72-73	10K	1/4W	10%		AB	TYPE CB	200101036
R74	4.7K	1/4W	10%		AB	TYPE CB	200104726
R75	12K	1/4W	10%		AB	TYPE CB	200101236
R76	4.7K	1/4W	10%		AB	TYPE CB	200104726
R77	47K	1/4W	10%		AB	TYPE CB	200104736
R78	10K	1/4W	10%		AB	TYPE CB	2C0101036
RV1-3	SILICON				SCHAUER	SV-1	565510000
U1-4	8PDIL	80MW		180	SIGNETICS	N5558V	5CC055580
U5	14DILP				RCA	CA3045	5CC030450
U6	16DILP				TI	SN74123N	510074123
U7	14DILP				RCA	CA3045	5CC030450
U8	8PDIL	80MW		180	SIGNETICS	N5558V	5CC055580
U9	DIL				TI	SN7413N14P	510074130
U10	14DILP				TI	SN7493AN	510074930
U11	14PDIL				TI	SN7425N	510074250
U12	14DILP				TI	SN7401N	510074010
U13	14DILP				RCA	CA3045	5CC030450
U14	14DILP				TI	SN7401N	510074010
XU1-2	SKT IC 16P PC				AUGAT	316-AG5D-2R	8201C0400

Table 6—19. (cont'd)

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
XU3	14PDIL				AMP	583527 1	8201003C0
XU4	SKT IC 16P PC				AUGAT	316-AG5D-2R	82C1C04C0
XU5	14PDIL				AMP	583527 1	8201003C0
XU6	SKT IC LOW PROF 8PDIL				AMP	583640-1	82C00C4C0
XU7	14PDIL				AMP	583527 1	8201003C0

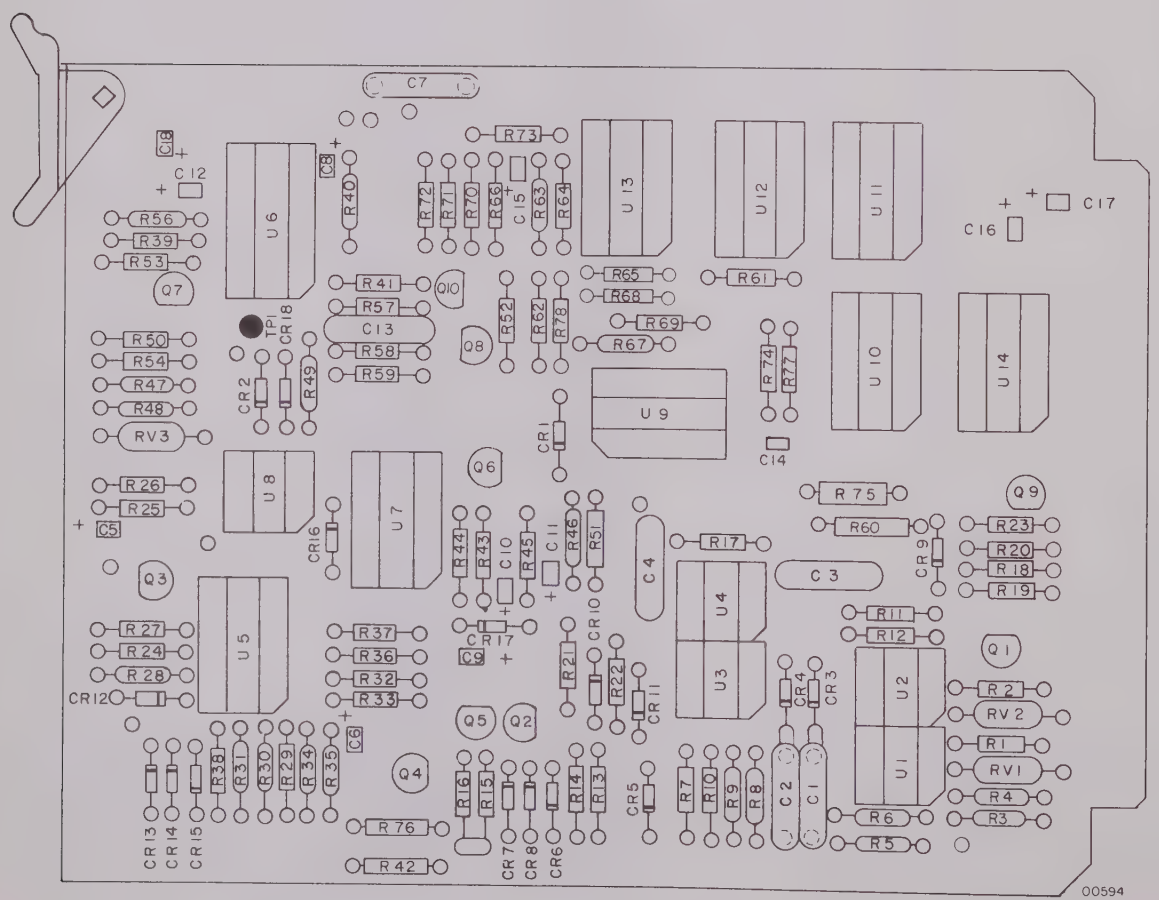


Figure 6—12. Model 2762 DC Input, A10 (96073), Component Location.

Table 6—20. Model 2762 Buffer, A11 (96551) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	22UF		10%	6V	KEMET	T330A226K006AS	31C002260
CR1	DO35	500Mw		75V	FAIRCHILD	1N4148	56C041480
K1	RELAY, FLAT, 2C PC				MIDTEX	181-12A100	60410480C
Q1	TO92MSS	310Mw		40V	MOTOROLA	2N3905	552039050
R1	4.7K	1/4W	10%		AB	TYPE CB	200104726
R2	5.6K	1/4W	10%		AB	TYPE CB	200105626
R3	5.6K	1/4W	10%		AB	TYPE CB	200105626
R4	2.2K	1/4W	10%		AB	TYPE CB	200102226
R5	2.2K	1/4W	10%		AB	TYPE CB	200102226
R6-7	3.3K	1/4W	10%		AB	TYPE CB	200103326
R8	2.2K	1/4W	10%		AB	TYPE CB	200102226
R9	1K	1/4W	10%		AB	TYPE CB	200101026
R10	390-	1/4W	10%		AB	TYPE CB	200103916
R11	2.2K	1/4W	10%		AB	TYPE CB	200102226
R12	4.7K	1/4W	10%		AB	TYPE CB	200104726
R13	330-	1/4W	10%		AB	TYPE CB	200103316
R14-16	5.6K	1/4W	10%		AB	TYPE CB	200105626
R17-19	3.3K	1/4W	10%		AB	TYPE CB	200103326
R20	5.6K	1/4W	10%		AB	TYPE CB	200105626
R21	5.6K	1/4W	10%		AB	TYPE CB	200105626
R22	3.3K	1/4W	10%		AB	TYPE CB	200103326
U1	DILP				TI	SN7407N	51C074070
U2	14DILP				TI	SN7405N	51C074050
U3	DILP				TI	SN7407N	51C074070
U4	14DILP				TI	SN7406N	51C074060
U5	14DILP				TI	SN74C0N	51C074CC0
U6	14DILP				SIGNETICS	SP384A	51C003840
U7	14DILP				SIGNETICS	SP384A	51C003840
U8	14DILP				TI	SN74C0N	51C074CC0
U9	14DILP				TI	SN74C0N	51C074CC0

Table 6—20. (cont'd)

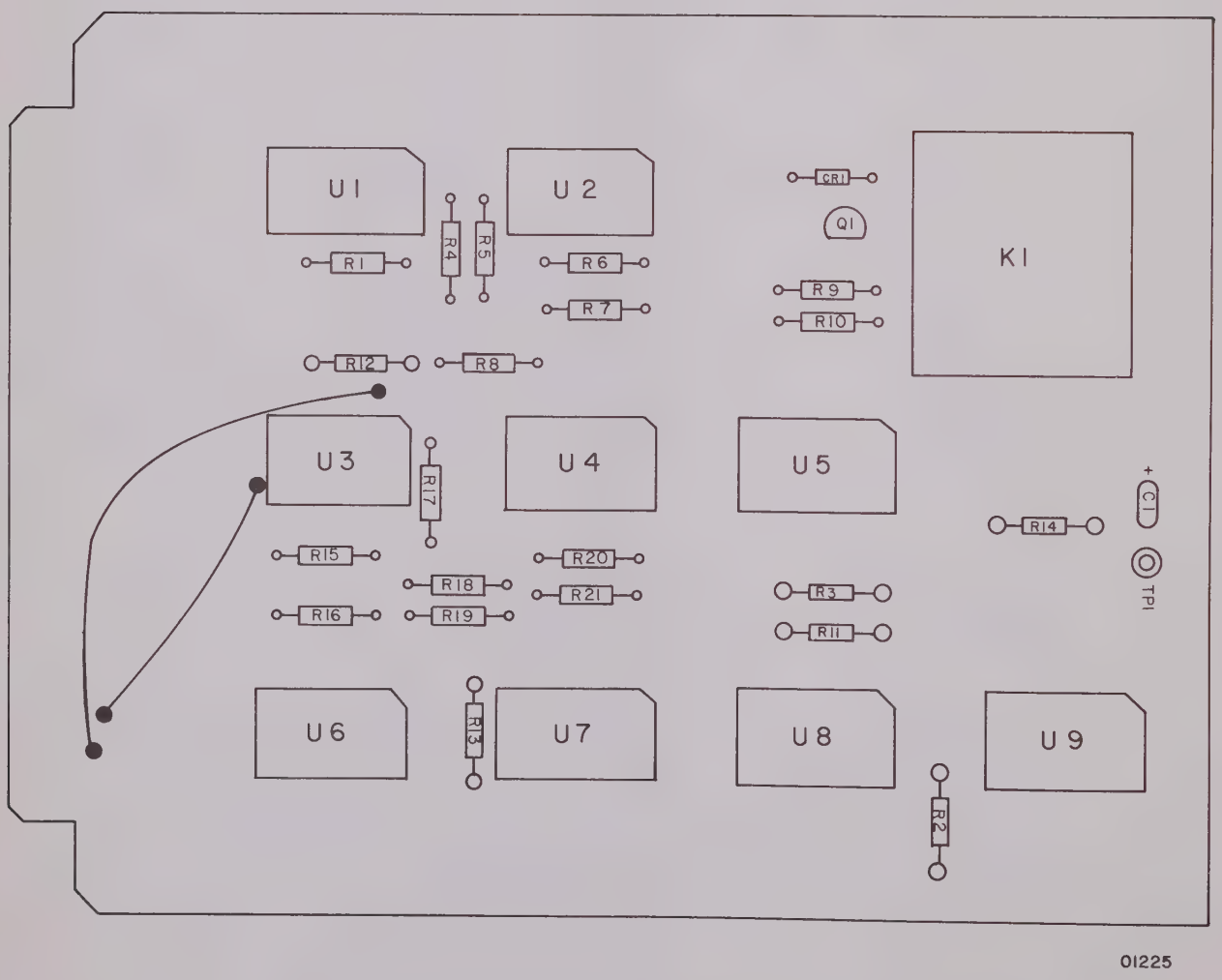


Figure 6—13. Model 2762 Buffer, A11 (96551), Component Location.

Table 6—21. Model 2762 Interconnection, A12 (96580) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
J20	34PIN				3M CC.	3431-1002	654002600
R1	47-	1/4W	10%		AB	TYPE CB	200104706

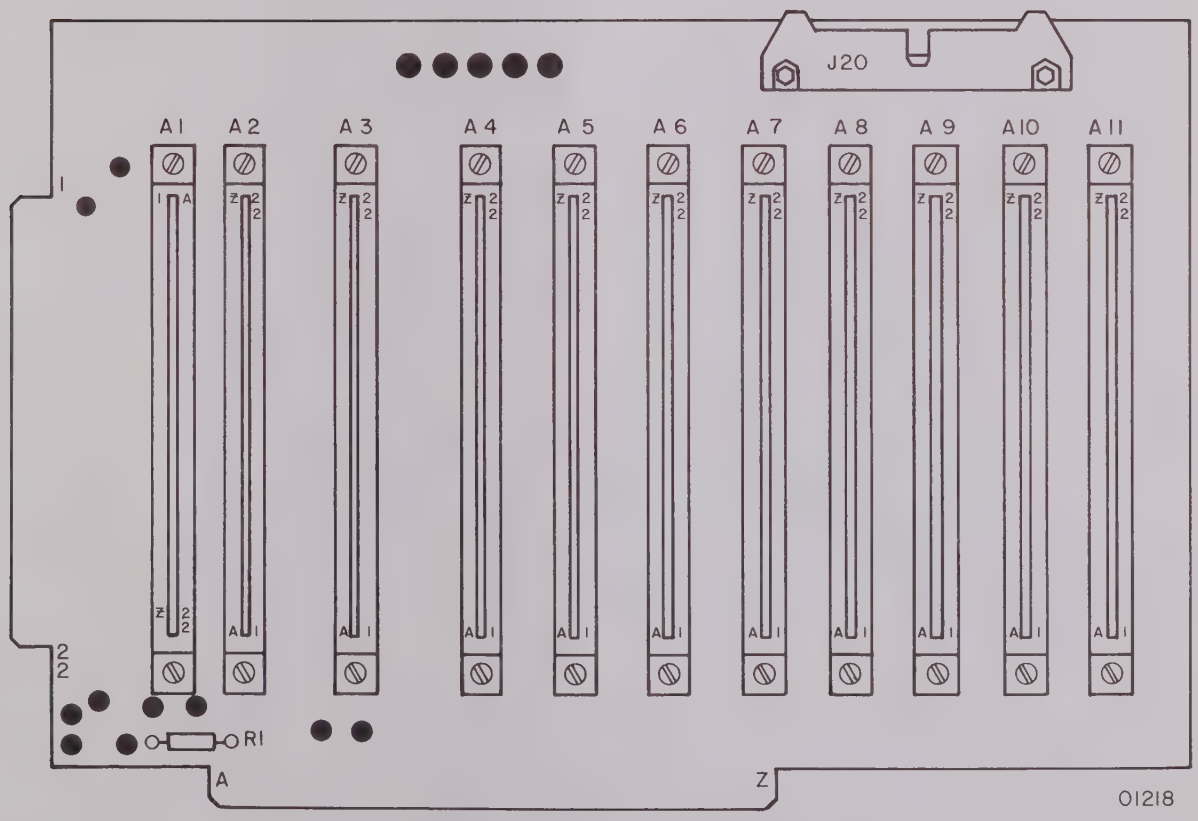


Figure 6—14. Model 2762 Interconnection, A12 (96580), Component Location.

Table 6-23. Model 2762 Code Lamp, A13 (95935) Parts List.

REFERENCE DESIGNATION	SELECTION OPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
DS1-6	LED	75MA		1.6V	LITRONIX	RED-LIT2	564500100
RN-1	10K	1/4W	10%		AB	TYPE CB	200101016

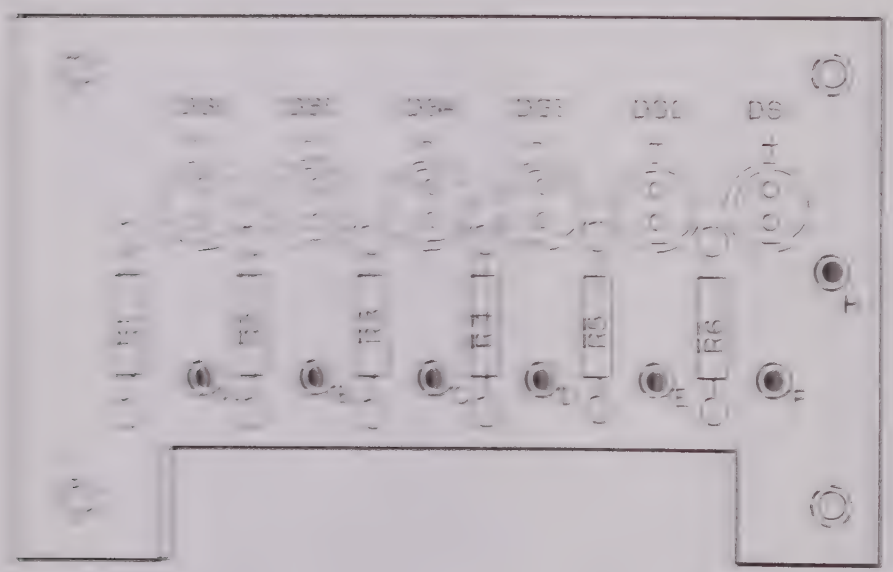


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Figure 6-36. Model 2762 Code Lamp, A13 (95935), Component Location.

Table 6—23. Model 2762 Supervision Lamp, A14 (96589) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
DS1-4	LED	75MA		1.6V	LITRONIX	RED-LIT2	564500100
R1-4	100-	1/4W	10%		AB	TYPE CB	200101016

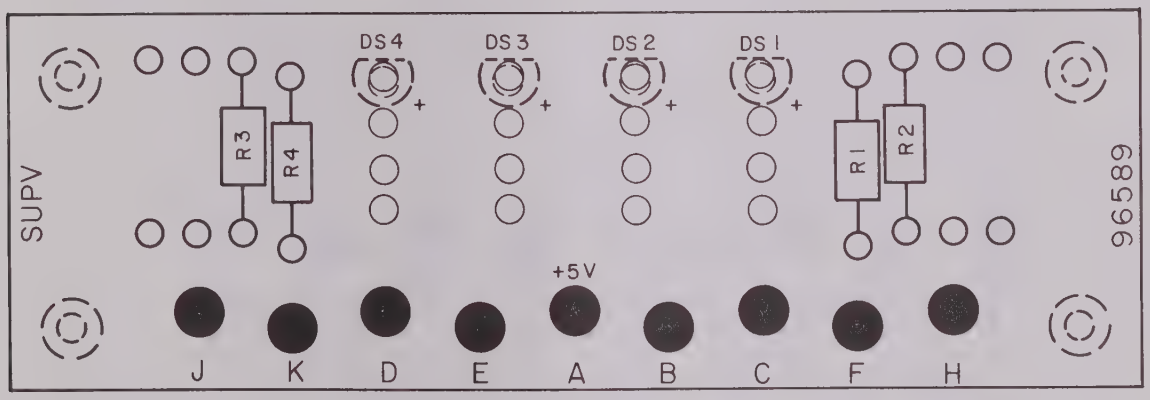

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Figure 6—16. Model 2762 Supervision Lamp, A14 (96589), Component Location.

Table 6—24. Model 2762 Supervision Lamp, A14 (96589) for Options 4 and 5 Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
CS1-8	LED	75MA		1.6V	LITRONIX	RED-LIT2	564500100
R1-8	100-	1/4W	10%		AB	TYPE CB	200101016

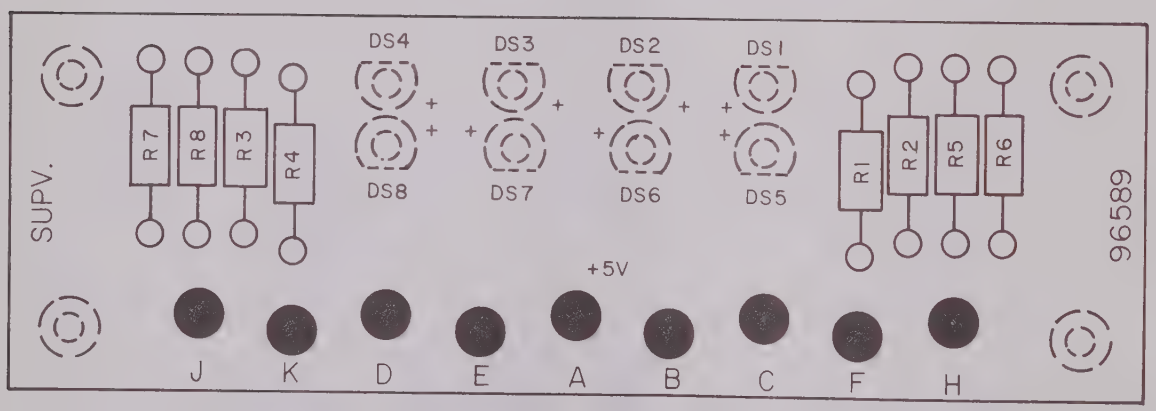

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Figure 6—17. Model 2762 Supervision Lamp, A14 (96589) for Options 4 and 5, Component Location.

Table 6—25. Model 2762 Frequency Lamp, A15 (95937) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
DS1	LED	75MA		1.6V	LITRONIX	RED-LIT2	564500100
DS2	LED	75MA		1.6V	LITRONIX	RED-LIT2	564500100
DS3	LED	75MA		1.6V	LITRONIX	RED-LIT2	564500100
DS4	LED	75MA		1.6V	LITRONIX	RED-LIT2	564500100
DS5	LED	75MA		1.6V	LITRONIX	RED-LIT2	564500100
DS6	LED	75MA		1.6V	LITRONIX	RED-LIT2	564500100
R1	100-	1/4W	10%		AB	TYPE CB	200101016
R2	100-	1/4W	10%		AB	TYPE CB	200101016
R3	100-	1/4W	10%		AB	TYPE CB	200101016
R4	100-	1/4W	10%		AB	TYPE CB	200101016
R5	100-	1/4W	10%		AB	TYPE CB	200101016
R6	100-	1/4W	10%		AB	TYPE CB	200101016

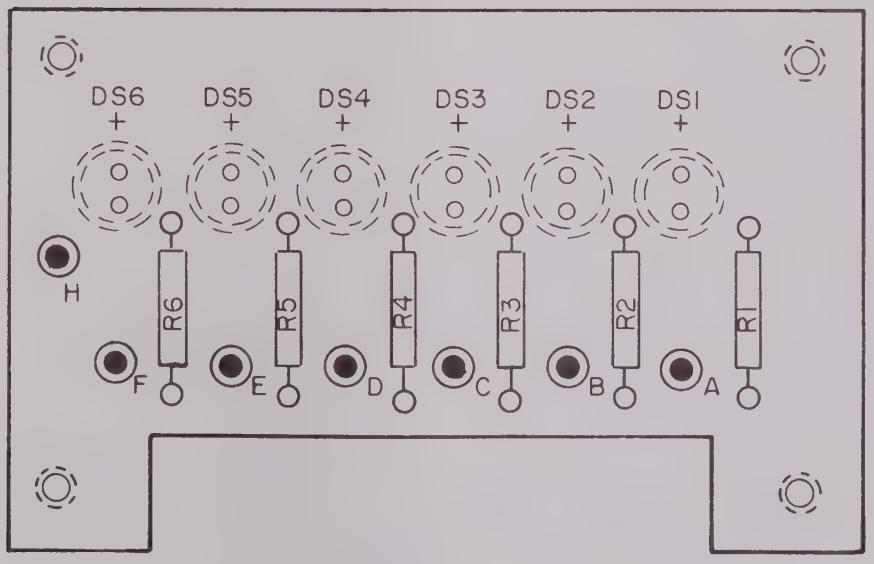

Figure 6—18. Model 2762 Frequency Lamp, A15 (95937), Component Location.

Table 6—26. Model 2762 Termination, A16 (95932) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
C1	.022UF		10%	400V	SPRAGUE	4PS-S22	321202230
C2	100UF			16V	SPRAGUE	TE-1162	300201071
C3	50UF			25V	SPRAGUE	TE1209	300205062
J1	10 PIN DUAL R/A PC				AMPHENOL	22521021105	651703600
R1	47K	1W	10%		AB	TYPE GB	200304736
R2	1K	1/4W	10%		AB	TYPE CB	200101026
R3	4.7K	1/4W	10%		AB	TYPE CB	200104726
R4	1.8K	1/4W	10%		AB	TYPE CB	200101826
R5	3.3K	1/4W	10%		AB	TYPE CB	200103326
R6	3.3K	1/4W	10%		AB	TYPE CB	200103326
R7	3.3K	1/4W	10%		AB	TYPE CB	200103326
R8	3.3K	1/4W	10%		AB	TYPE CB	200103326
R9	3.3K	1/4W	10%		AB	TYPE CB	200103326

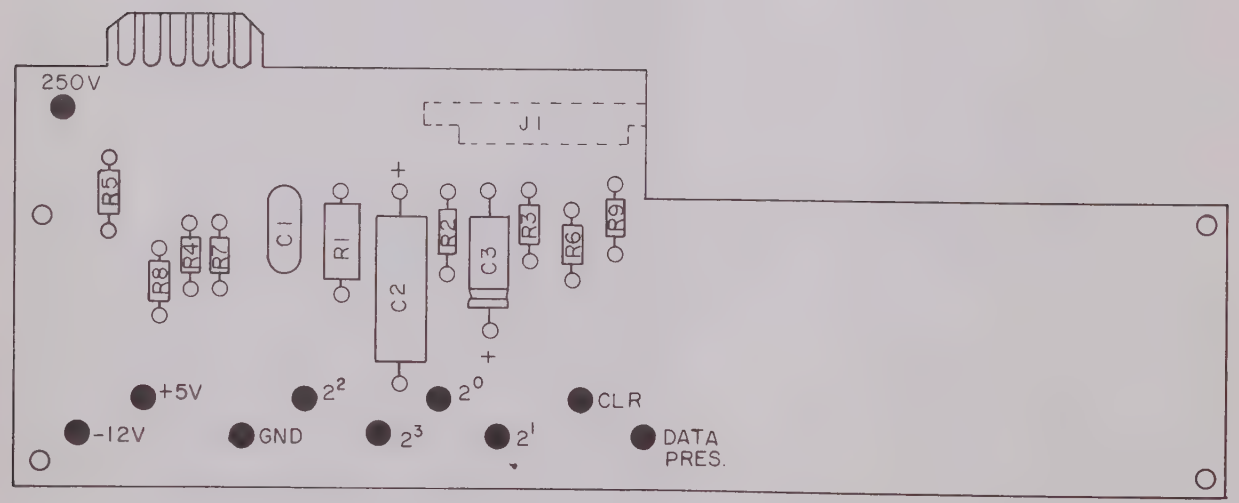

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Figure 6—19. Model 2762 Termination, (95932) A16, Component Location.

Table 6—27. Model 2762 Accessory, A17 (96593) Parts List.

REFERENCE DESIGNATOR	DESCRIPTION VALUE	POWER	TOL	VOLTS	MFGR.	MFGR. PART NO.	N.E.C. PART NO.
J21	34PIN				3M CO.	3431-2002	654002400
J23	33PIN	STUFFED			ELCO	8026-033-491-801	653206CC0

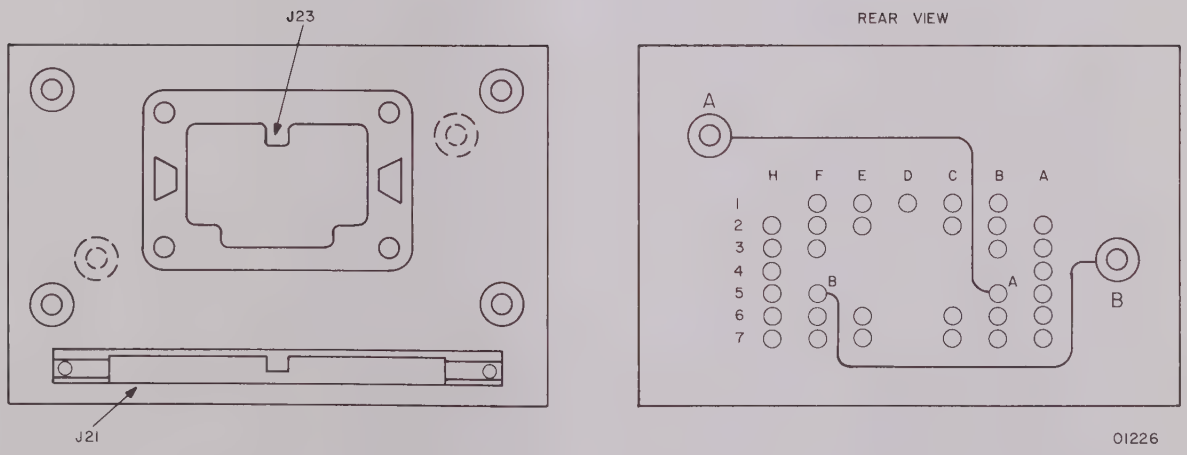


Figure 6—20. Model 2762 Accessory, A17 (96593), Component Location.

SECTION 7
SCHEMATIC DIAGRAMS

7.1 INTRODUCTION.

7.2 This section provides the schematic diagrams for the Model 2762 Loop Signaling Display Unit.

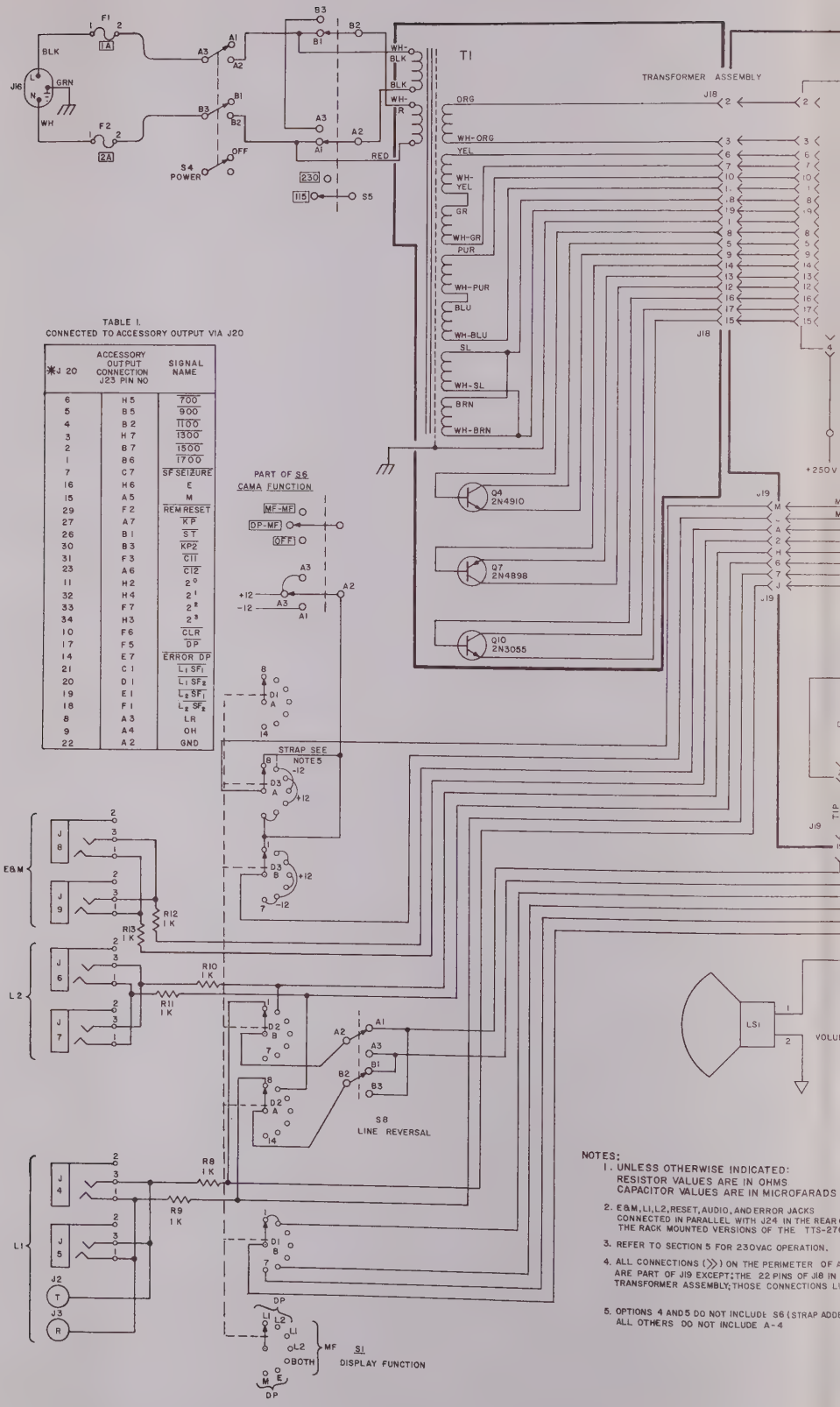
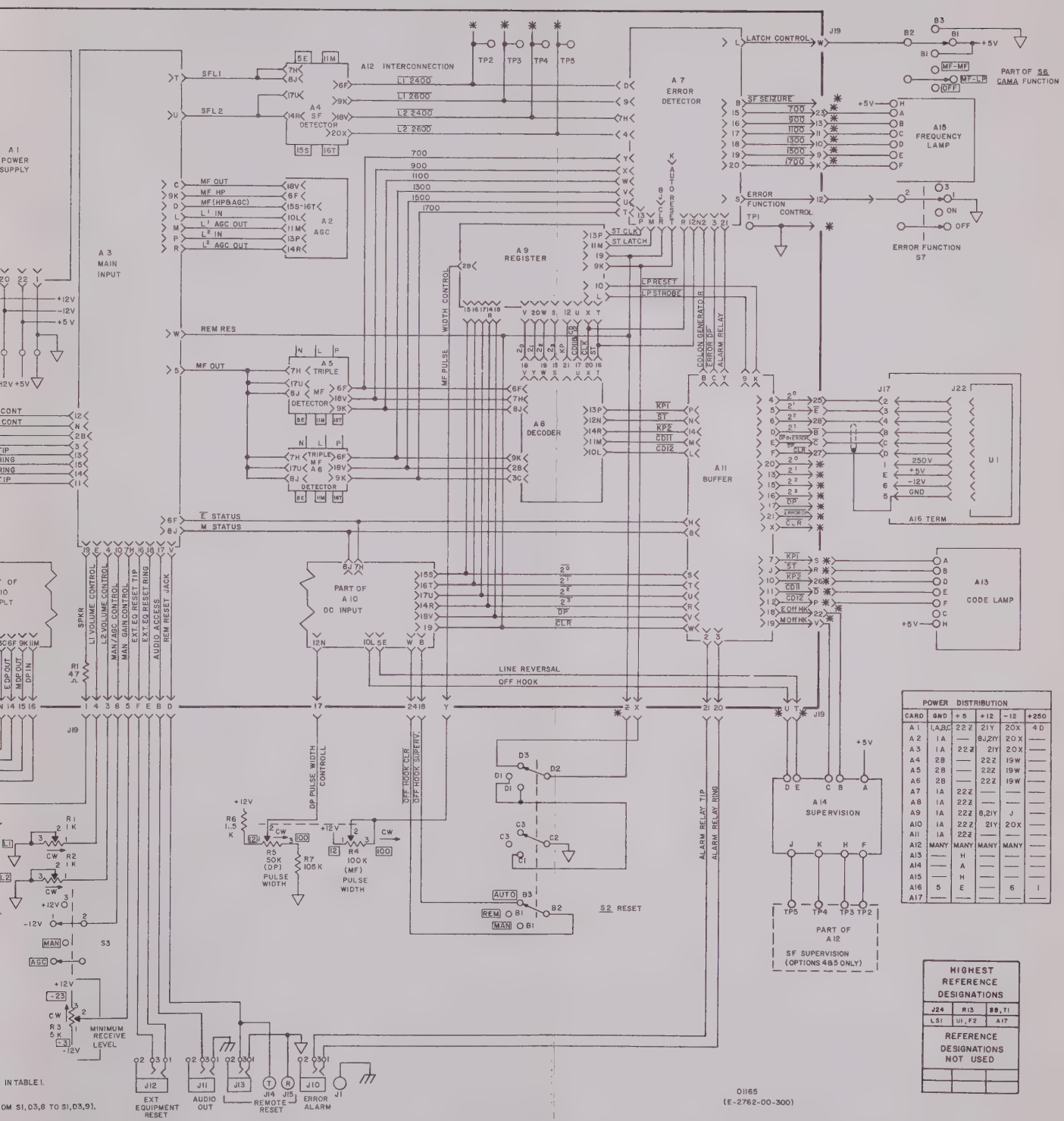


TABLE I.
CONNECTED TO ACCESSORY OUTPUT VIA J20

*J 20	ACCESSORY OUTPUT CONNECTION J23 PIN NO	SIGNAL NAME
6	H 5	$\overline{700}$
5	B 5	$\overline{900}$
4	B 2	$\overline{1100}$
3	H 7	$\overline{1300}$
2	B 7	$\overline{1500}$
1	B 6	$\overline{1700}$
7	C 7	$\overline{SF}$ SEIZURE
16	H 6	E
15	A 5	M
29	F 2	$\overline{REM}$ RESET
27	A 7	$\overline{KP}$
26	B 1	$\overline{ST}$
30	B 3	$\overline{KP2}$
31	F 3	$\overline{C11}$
23	A 6	$\overline{C12}$
11	H 2	2^0
32	H 4	2^1
33	F 7	2^2
34	H 3	2^3
10	F 6	$\overline{CLR}$
17	F 5	$\overline{DP}$
14	E 7	$\overline{ERROR\ DP}$
21	C 1	$\overline{L_1 SF_1}$
20	D 1	$\overline{L_1 SF_2}$
19	E 1	$\overline{L_2 SF_1}$
18	F 1	$\overline{L_2 SF_2}$
8	A 3	LR
9	A 4	OH
22	A 2	GND

NOTES:
1. UNLESS OTHERWISE INDICATED:
RESISTOR VALUES ARE IN OHMS
CAPACITOR VALUES ARE IN MICROFARADS
2. E&M, L1, L2, RESET, AUDIO, AND ERROR JACKS CONNECTED IN PARALLEL WITH J24 IN THE REAR OF THE RACK MOUNTED VERSIONS OF THE TTS-27
3. REFER TO SECTION 5 FOR 230VAC OPERATION.
4. ALL CONNECTIONS (⟩⟩) ON THE PERIMETER OF A ARE PART OF J19 EXCEPT; THE 22 PINS OF J18 IN TRANSFORMER ASSEMBLY; THOSE CONNECTIONS L
5. OPTIONS 4 AND 5 DO NOT INCLUDE S6 (STRAP ADDE ALL OTHERS DO NOT INCLUDE A-4



POWER DISTRIBUTION

CARD	GND	+5	+12	-12	+250
A1	1,ABC	22Z	21Y	20X	4D
A2	1A	—	8J,21Y	20X	—
A3	1A	22Z	21Y	20X	—
A4	2B	—	22Z	19W	—
A5	2B	—	22Z	19W	—
A6	2B	—	22Z	19W	—
A7	1A	22Z	—	—	—
A8	1A	22Z	—	—	—
A9	1A	22Z	8,21Y	J	—
A10	1A	22Z	21Y	20X	—
A11	1A	22Z	—	—	—
A12	MANY	MANY	MANY	MANY	—
A13	—	H	—	—	—
A14	—	A	—	—	—
A15	—	H	—	—	—
A16	5	E	—	6	1
A17	—	—	—	—	—

HIGHEST REFERENCE DESIGNATIONS

J24	R13	98,T1
LS1	U1,F2	A17

REFERENCE DESIGNATIONS NOT USED

Figure 7—1. Model 2762 Overall Schematic Diagram.

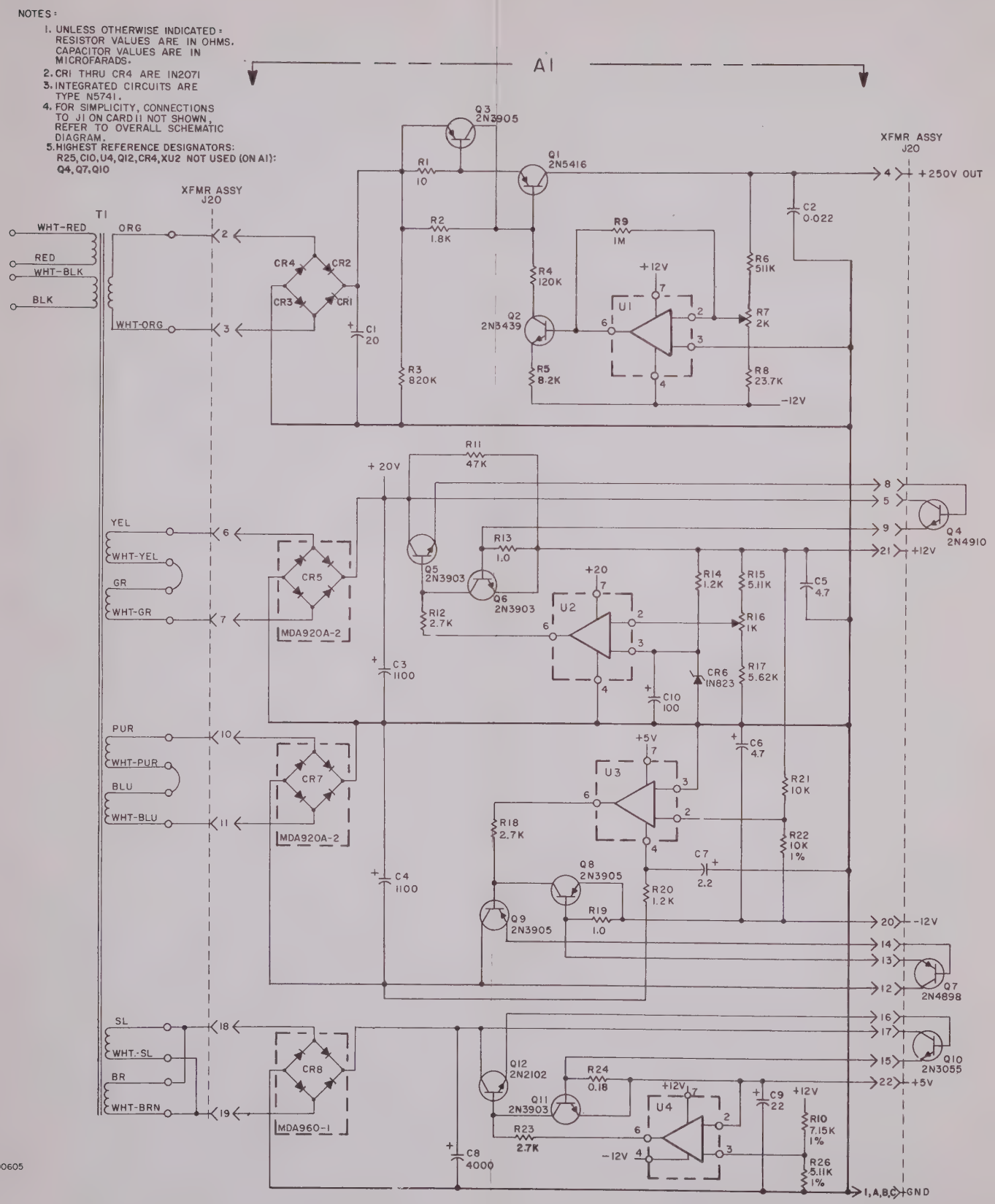
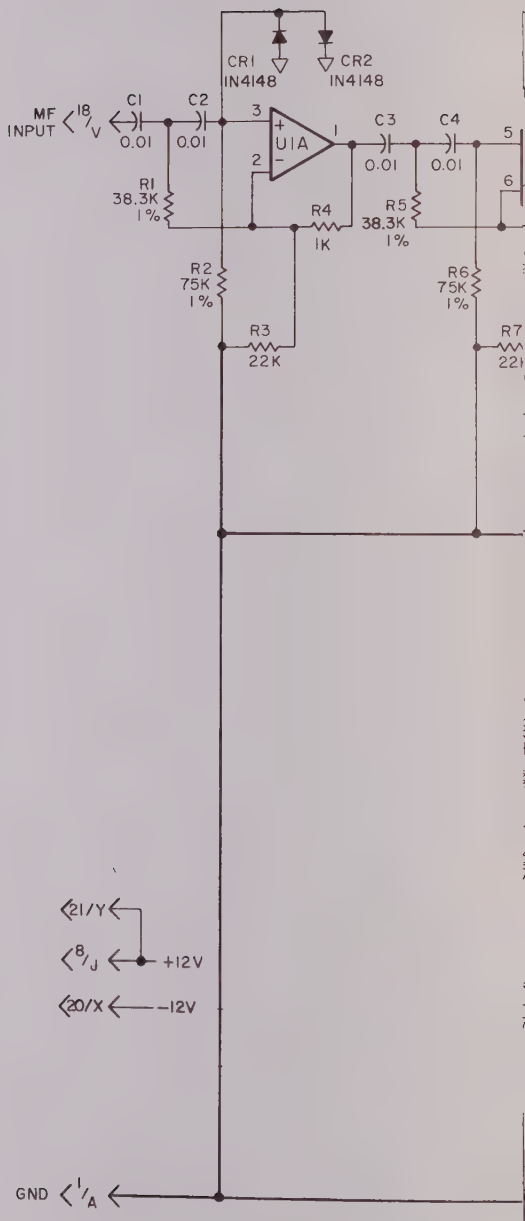
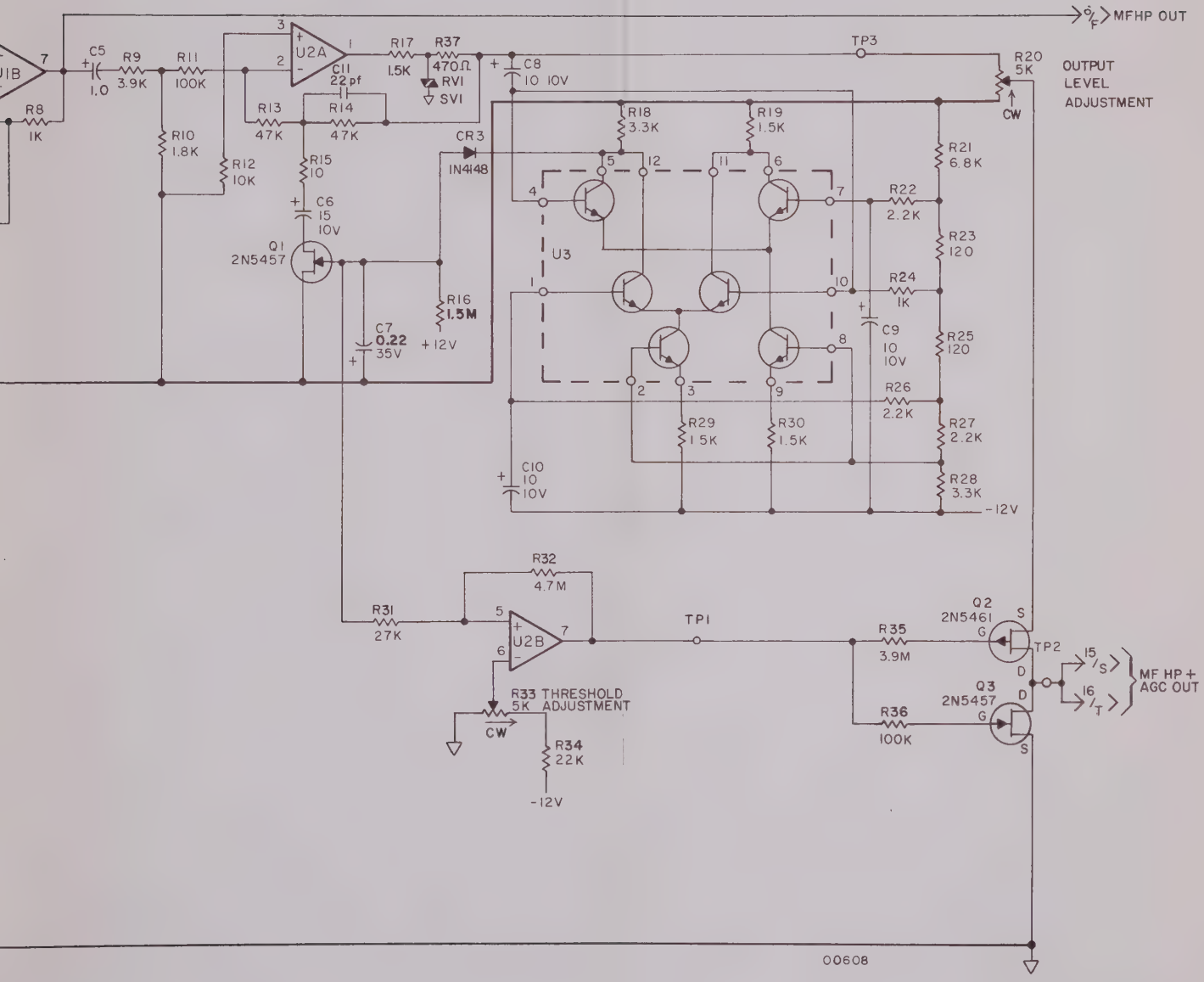


Figure 7—2. Model 2762 Power Supply (A1) Schematic Diagram.



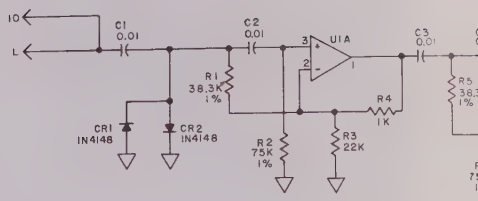
	TYPE	+V	-V
U1-U2	N5558V	8	4
U3	CA3026		

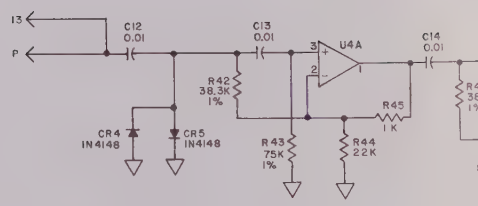
NOTES:
1. U
R
C
I
2. MA
U



LESS OTHERWISE INDICATED:
SISTOR VALUES ARE IN OHMS.
PACITOR VALUES ARE IN MICROFARADS.
DUCTANCE VALUES ARE IN MILLIHENRYS.
X REFERENCE DESIGNATIONS USED: R37, C11,
, Q3, RVI, CR-1.

Figure 7-3. Model 2762 MF Input (AGC) (A2) Schematic Diagram.





NOTES:
1. UNLESS OTHE
RESISTOR VA
CAPACITOR V
INDUCTANCE

HIGHEST REFERENCE DESIGNATIONS		
R78	C22	U7
Q6,RV2	CR6	TP7

REFERENCE DESIGNATIONS NOT USED		
	U38	

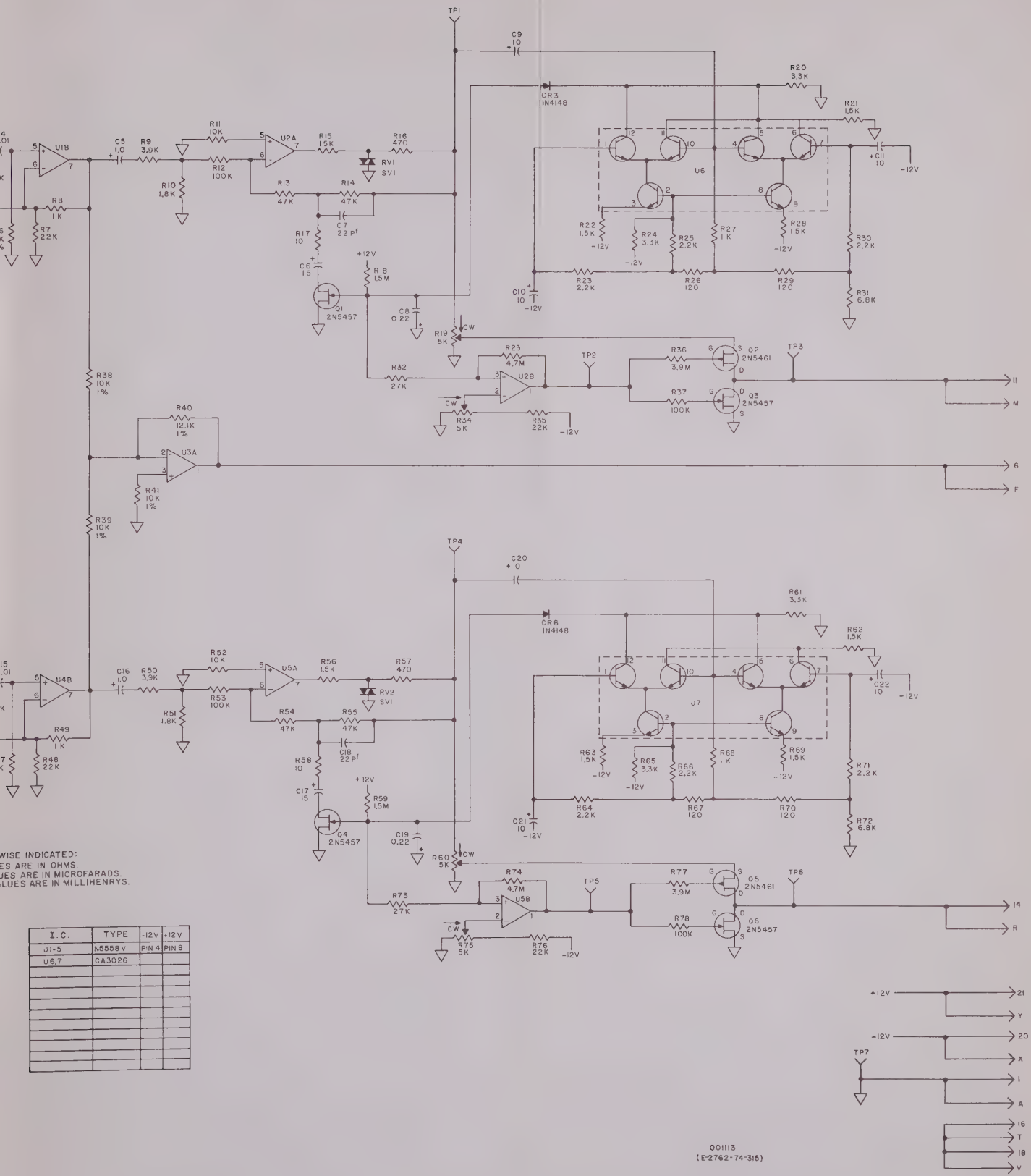
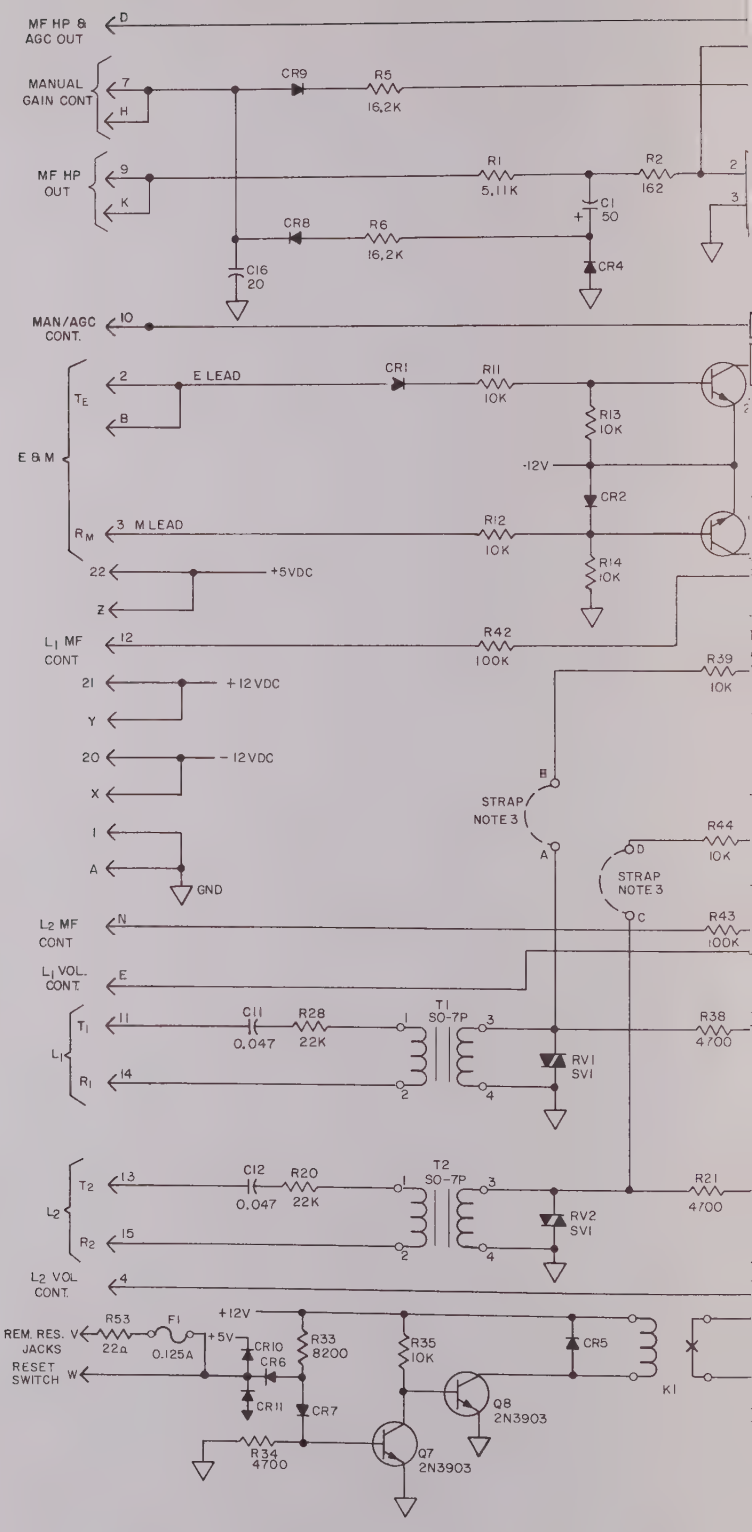


Figure 7—4. Model 2762 Dual AGC (A2 For Options 4 and 5) Schematic Diagram.


MF HP & AGC OUT
D
MANUAL GAIN CONT
7
H
CR9
R5
16.2K
MF HP OUT
9
K
R1
5.11K
R2
162
C1
50
CR8
R6
16.2K
C16
20
CR4
MAN/AGC CONT.
10
E & M
T_E
2
B
E LEAD
CR1
R11
10K
R13
10K
-12V
CR2
R_M
3 M LEAD
R12
10K
R14
10K
22
+5VDC
Z
L_1 MF CONT
12
R42
100K
21
+12VDC
Y
20
-12VDC
X
1
A
GND
R39
10K
B
STRAP NOTE 3
A
R44
10K
D
STRAP NOTE 3
C
L_2 MF CONT
N
R43
100K
L_1 VOL. CONT.
E
T_1
L_1
R_1
11
14
C11
0.047
R28
22K
T1
SO-7P
R38
4700
RV1
SV1
T_2
L_2
R_2
13
15
C12
0.047
R20
22K
T2
SO-7P
R21
4700
RV2
SV1
L_2 VOL. CONT.
4
REM. RES. JACKS
RESET SWITCH
V
W
R53
22Ω
F1
0.125A
+5V
+12V
CR10
CR6
CR11
CR7
R33
8200
R34
4700
R35
10K
Q7
2N3903
Q8
2N3903
CR5
K1

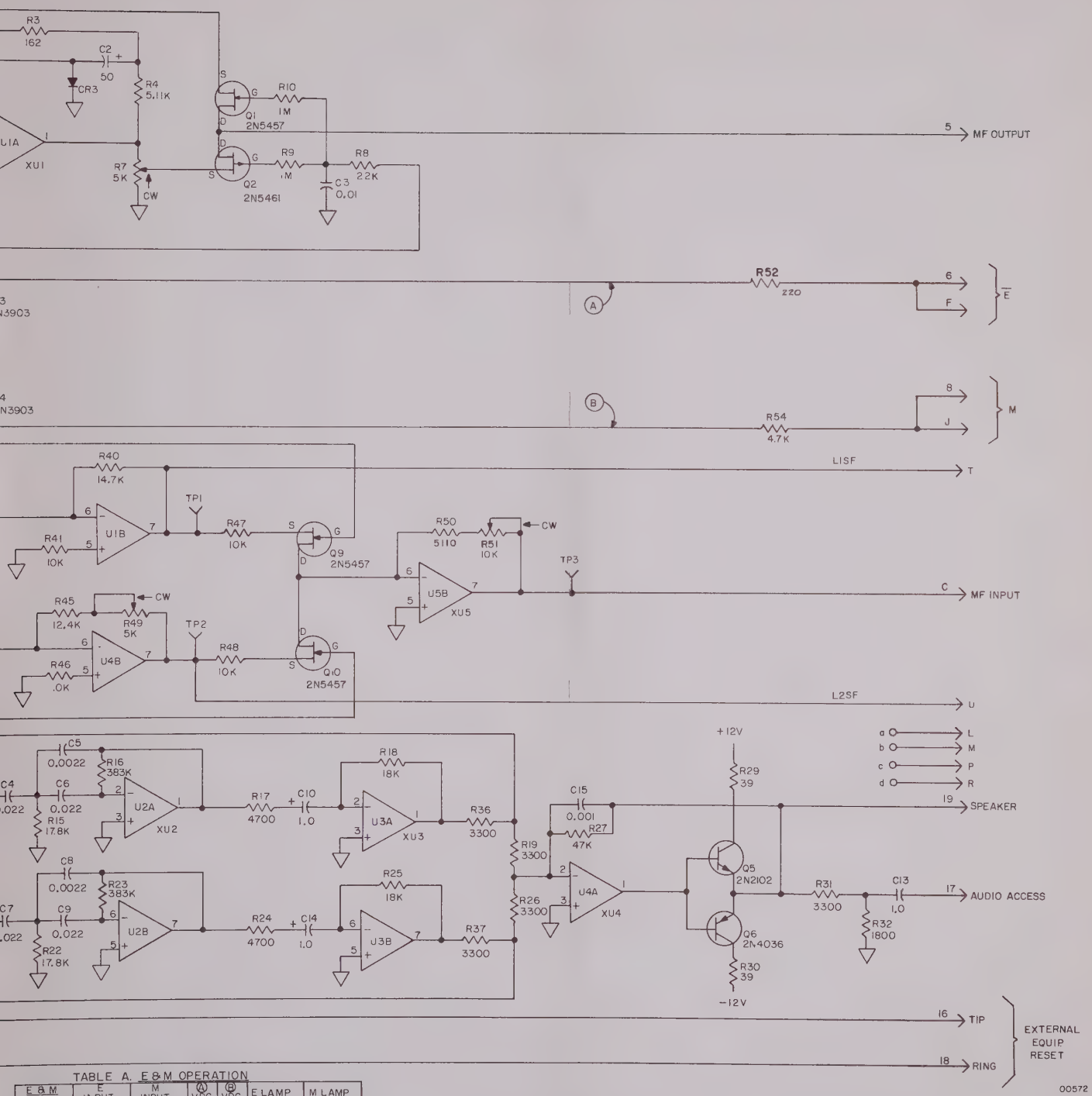


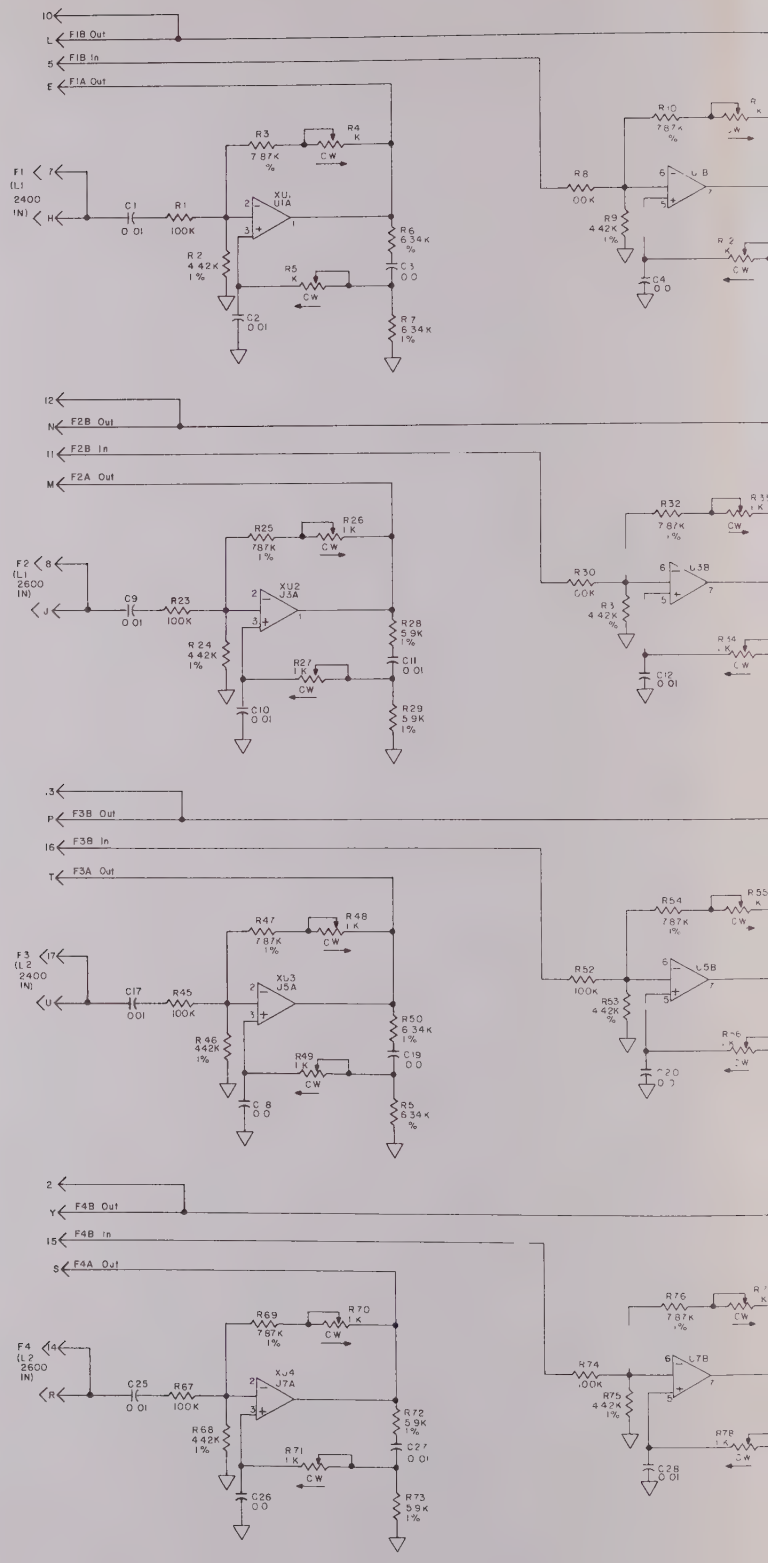
TABLE A. E&M OPERATION

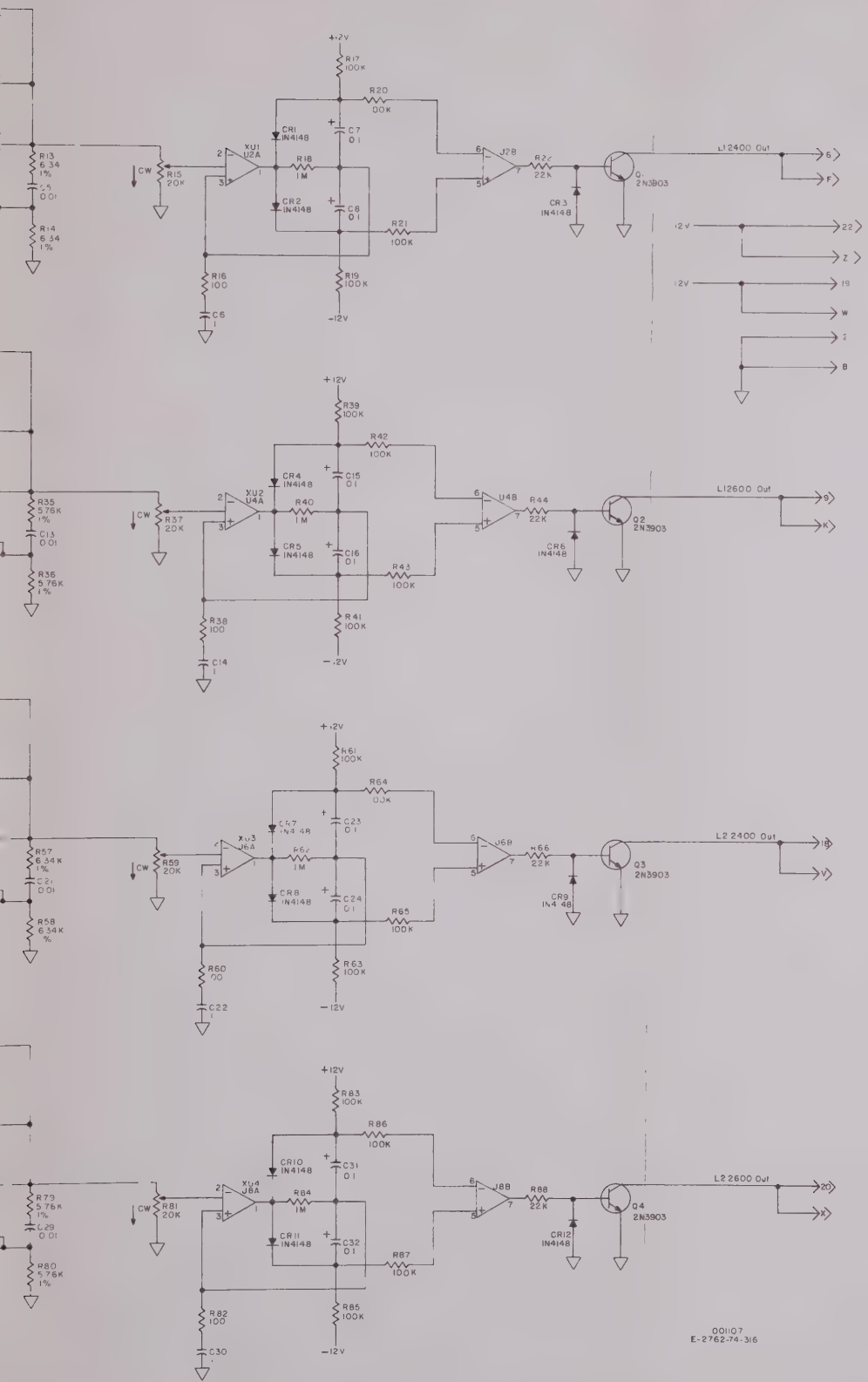
E&M CONDITION	E INPUT	M INPUT	Ⓐ VDC	Ⓑ VDC	E LAMP	M LAMP
BOTH ON HK	OPEN	OPEN OR GND	+5	-12	ON	ON
E OFF HK	GND	OPEN OR GND	-12	12	OFF	ON
M OFF HK	OPEN	-48V	+5	+5	ON	OFF
E&M OFF HK	GND	-48V	-12	+5	OFF	OFF

NOTES:

1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS.
   DIODES ARE IN4148.
   UI THRU U5 ARE TYPE N5558V (PIN 4=-12V, PIN 8=+12V)
2. HIGHEST REFERENCE DESIGNATIONS ARE R54, C16, CR11, RV2, U5, Q10, K1, T2, F1, XU5, TP3. NOT USED: U5A.
3. OPTIONS 4 and 5 : STRAP A-a, B-b, C-c, D-d.
   ALL OTHERS STRAP A-B, C-D

Figure 7—5. Model 2762 Main Input (A3) Schematic Diagram.


10
L
F1B Out
5
E
F1A Out
F1 (L1 2400 IN)
7
H
J
C1 0 01
R1 100K
XU1 U1A
R3 7 87K 1%
R4 K CW
R2 442K 1%
R5 K CW
R6 6 34K 1%
C3 0 0
C2 0 01
R7 6 34K 1%
R8 00K
R9 4 42K 1%
C4 0 0
12
N
F2B Out
11
M
F2A Out
F2 (L1 2600 IN)
8
J
C9 0 01
R23 100K
XU2 U3A
R25 787K 1%
R26 1K CW
R24 442K 1%
R27 1K CW
R28 5 9K 1%
C11 0 01
C10 0 01
R29 5 9K 1%
R30 00K
R31 4 42K 1%
C12 0 01
3
P
F3B Out
16
T
F3A Out
F3 (L2 2400 IN)
17
U
C17 001
R45 100K
XU3 U5A
R47 787K 1%
R48 1K CW
R46 442K 1%
R49 1K CW
R50 6 34K 1%
C19 0 0
C 8 0 0
R5 6 34K 1%
R52 100K
R53 4 42K 1%
C20 0 0
2
Y
F4B Out
15
S
F4A Out
F4 (L2 2600 IN)
14
R
C25 0 01
R67 100K
XU4 U7A
R69 787K 1%
R70 1K CW
R68 442K 1%
R71 1K CW
R72 5 9K 1%
C27 0 01
C26 0 0
R73 5 9K 1%
R74 00K
R75 4 42K 1%
C28 0 01

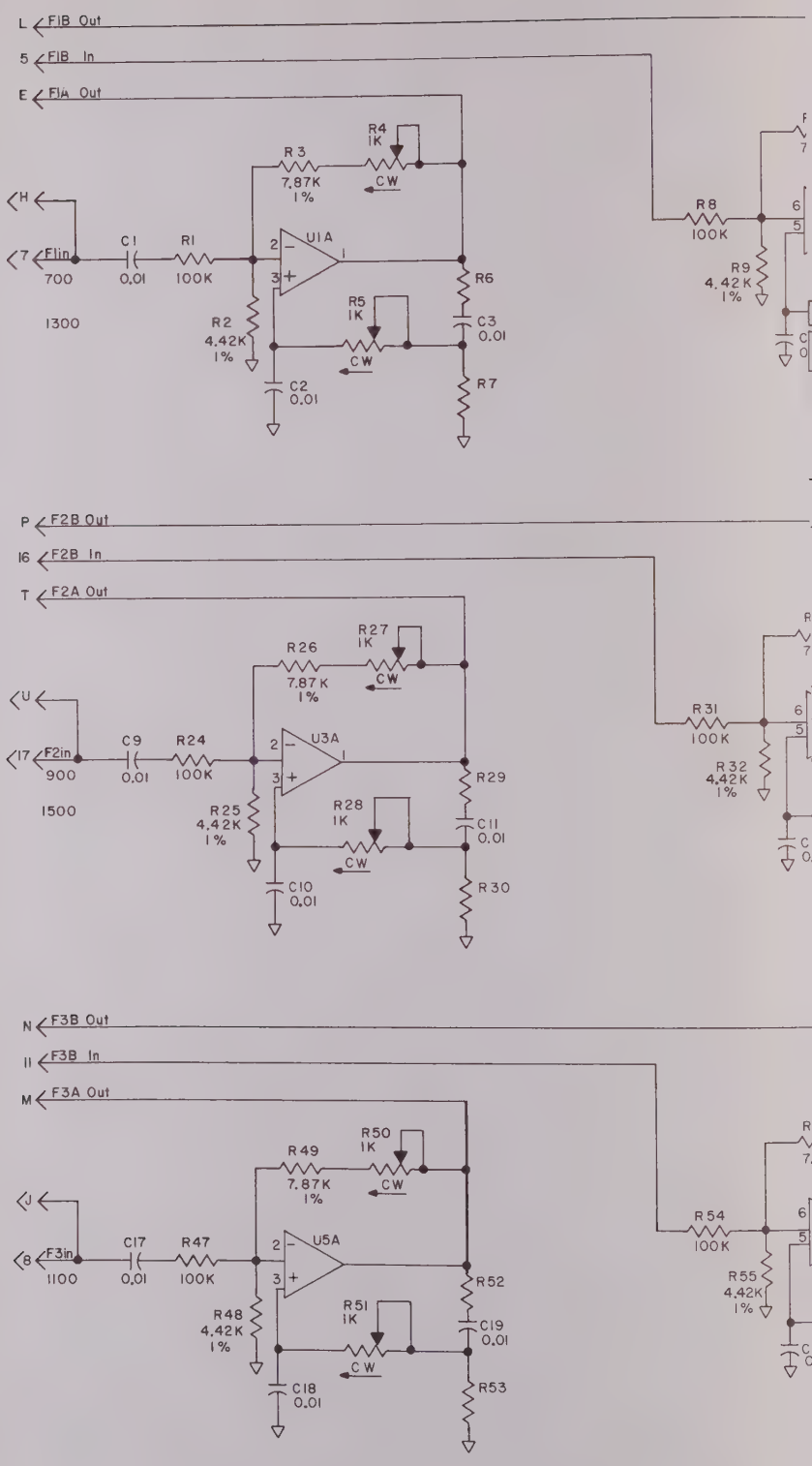


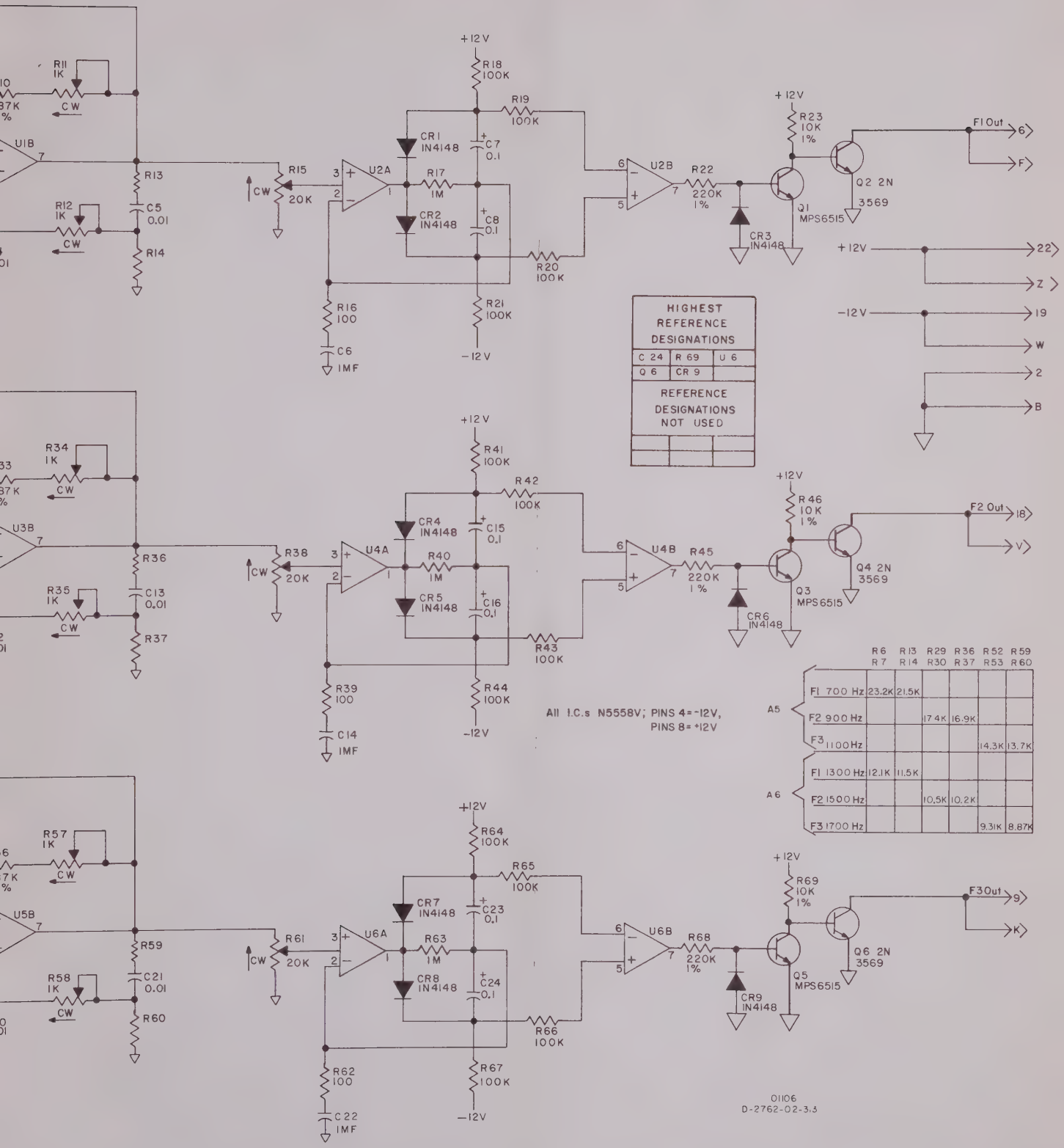
NOTES:
1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS.

2. ALL I.C.s N5558V: PIN4=-12V, PIN8=+12V

HIGHEST REFERENCE DESIGNATIONS		
R88	C32	CR12
Q4	U8	XU4
REFERENCE DESIGNATIONS NOT USED		

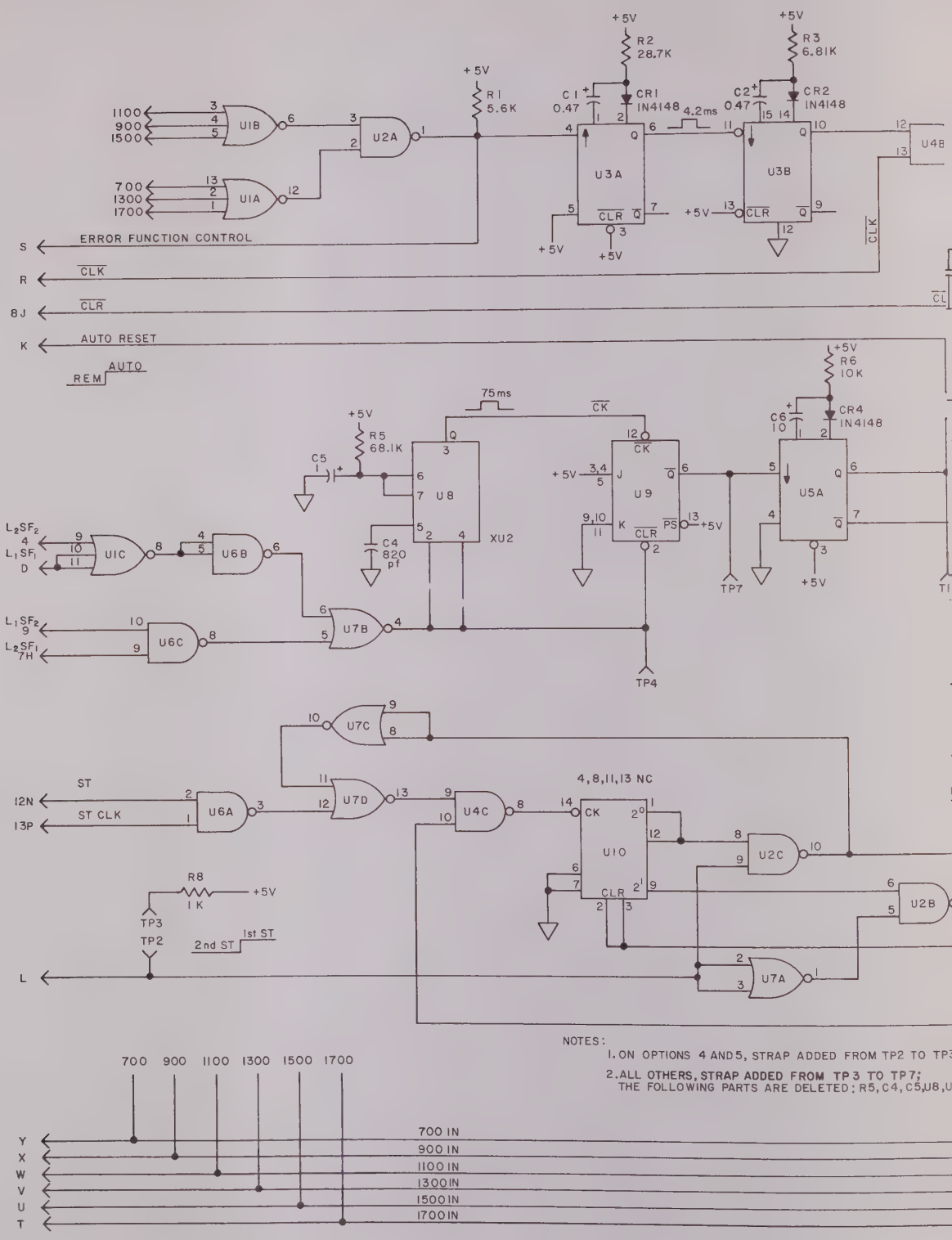
Figure 7—6. Model 2762 SF (VF) Detectors (A4) Schematic Diagram.


L F1B Out
5 F1B In
E F1A Out
H
7 F1in
700
1300
C1
0.01
R1
100K
U1A
R3
7.87K
1%
R4
1K
CW
R5
1K
CW
R2
4.42K
1%
C2
0.01
R6
C3
0.01
R7
R8
100K
R9
4.42K
1%
P F2B Out
16 F2B In
T F2A Out
U
17 F2in
900
1500
C9
0.01
R24
100K
U3A
R26
7.87K
1%
R27
1K
CW
R28
1K
CW
R25
4.42K
1%
C10
0.01
R29
C11
0.01
R30
R31
100K
R32
4.42K
1%
N F3B Out
11 F3B In
M F3A Out
J
8 F3in
1100
C17
0.01
R47
100K
U5A
R49
7.87K
1%
R50
1K
CW
R51
1K
CW
R48
4.42K
1%
C18
0.01
R52
C19
0.01
R53
R54
100K
R55
4.42K
1%



		R6 R7	R13 R14	R29 R30	R36 R37	R52 R53	R59 R60
A5	F1 700 Hz	23.2K	21.5K				
	F2 900 Hz			17.4K	16.9K		
	F3 1100 Hz					14.3K	13.7K
A6	F1 1300 Hz	12.1K	11.5K				
	F2 1500 Hz			10.5K	10.2K		
	F3 1700 Hz					9.31K	8.87K

Figure 7 – 7. Model 2762 MF Detectors (A5, A6) Schematic Diagram.


1100
900
1500
U1B
700
1300
1700
U1A
U2A
+5V
R1
5.6K
R2
28.7K
R3
6.81K
C1
0.47
CR1
IN4148
C2
0.47
CR2
IN4148
4.2ms
U3A
U3B
U4B
ERROR FUNCTION CONTROL
S
R
CLK
8J
CLR
K
AUTO RESET
REM
AUTO
R6
10K
CR4
IN4148
C6
10
75ms
R5
68.1K
C5
C4
820
pf
U8
XU2
U9
U5A
TP7
TP4
U1C
U6B
U6C
U7B
U7C
U7D
U6A
U4C
U10
U2C
U2B
U7A
ST
ST CLK
12N
13P
4,8,11,13 NC
R8
1K
TP3
TP2
2nd ST
1st ST
L
NOTES:
1. ON OPTIONS 4 AND 5, STRAP ADDED FROM TP2 TO TP3
2. ALL OTHERS, STRAP ADDED FROM TP3 TO TP7;
THE FOLLOWING PARTS ARE DELETED: R5, C4, C5, U8, U
700
900
1100
1300
1500
1700
Y
X
W
V
U
T
700 IN
900 IN
1100 IN
1300 IN
1500 IN
1700 IN

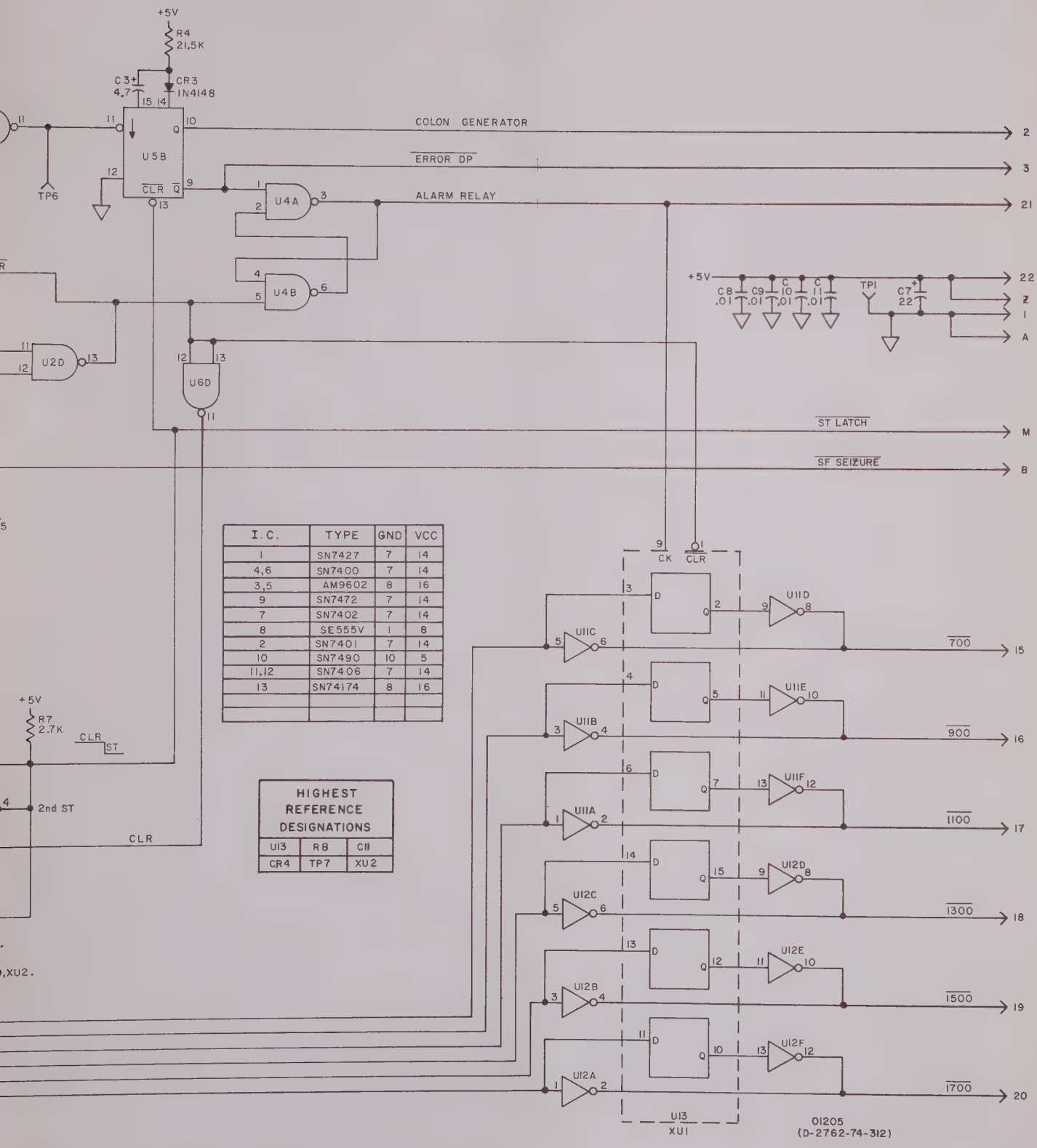
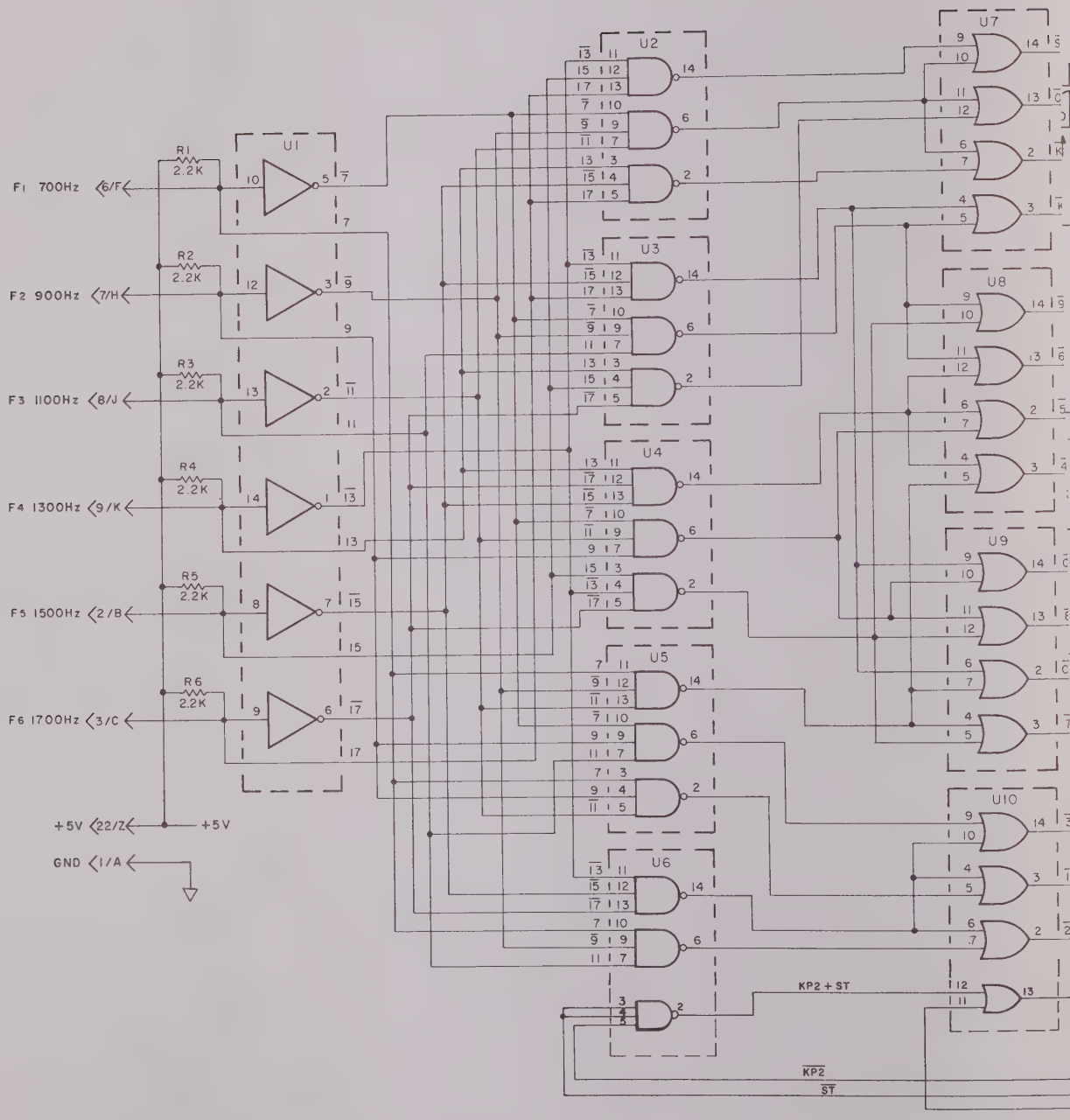
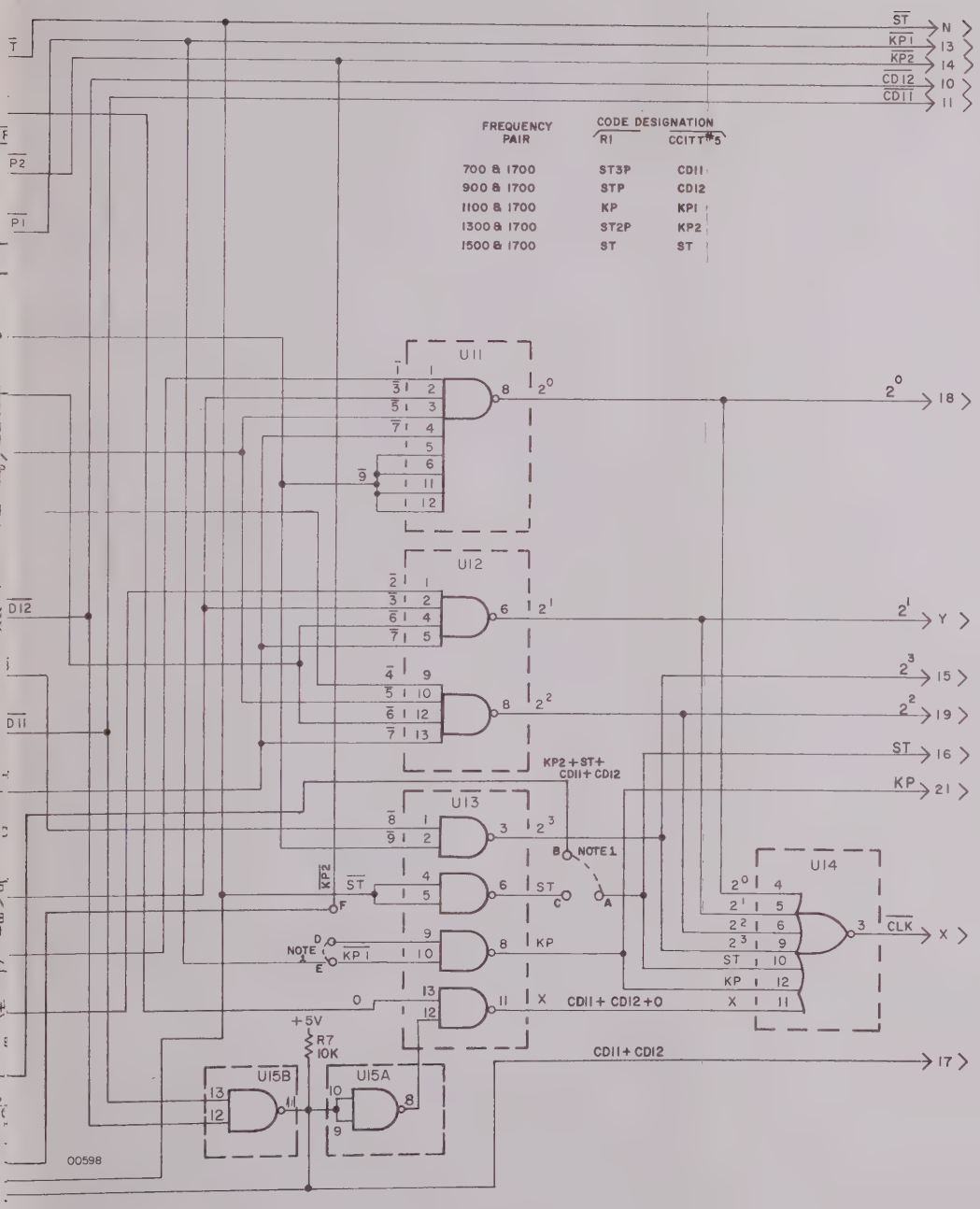


Figure 7–8. Model 2762 Error Detector (A7) Schematic Diagram.


F1 700Hz
F2 900Hz
F3 1100Hz
F4 1300Hz
F5 1500Hz
F6 1700Hz
+5V
GND
R1
R2
R3
R4
R5
R6
2.2K
U1
U2
U3
U4
U5
U6
U7
U8
U9
U10
KP2 + ST
KP2
ST



	VCC	GND	TYPE
U1	11	4	MC9718P
U2 – U6	8	1	SN377A
U7 – U10	8	1	SP384
U11	14	7	SN7430N
U12	14	7	SN7420N
U13	14	7	SN7400N
U14	8	1	SP314A
U15	14	7	SN7403N

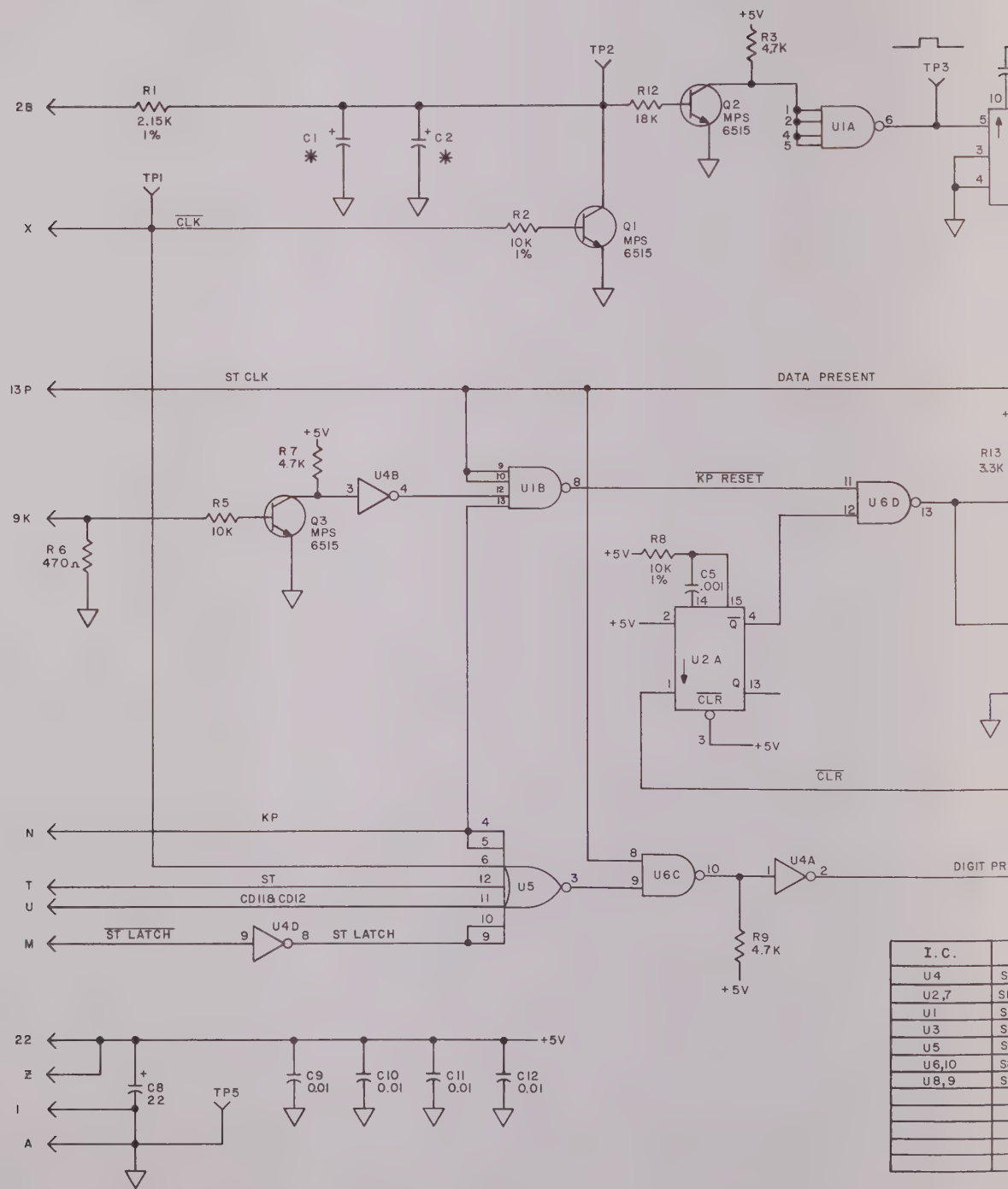
NOTE

1. FOR RI SIGNALING, STRAP A – B AND D – E.
2. FOR CCITT NO 5, STRAP A – C AND D – F.

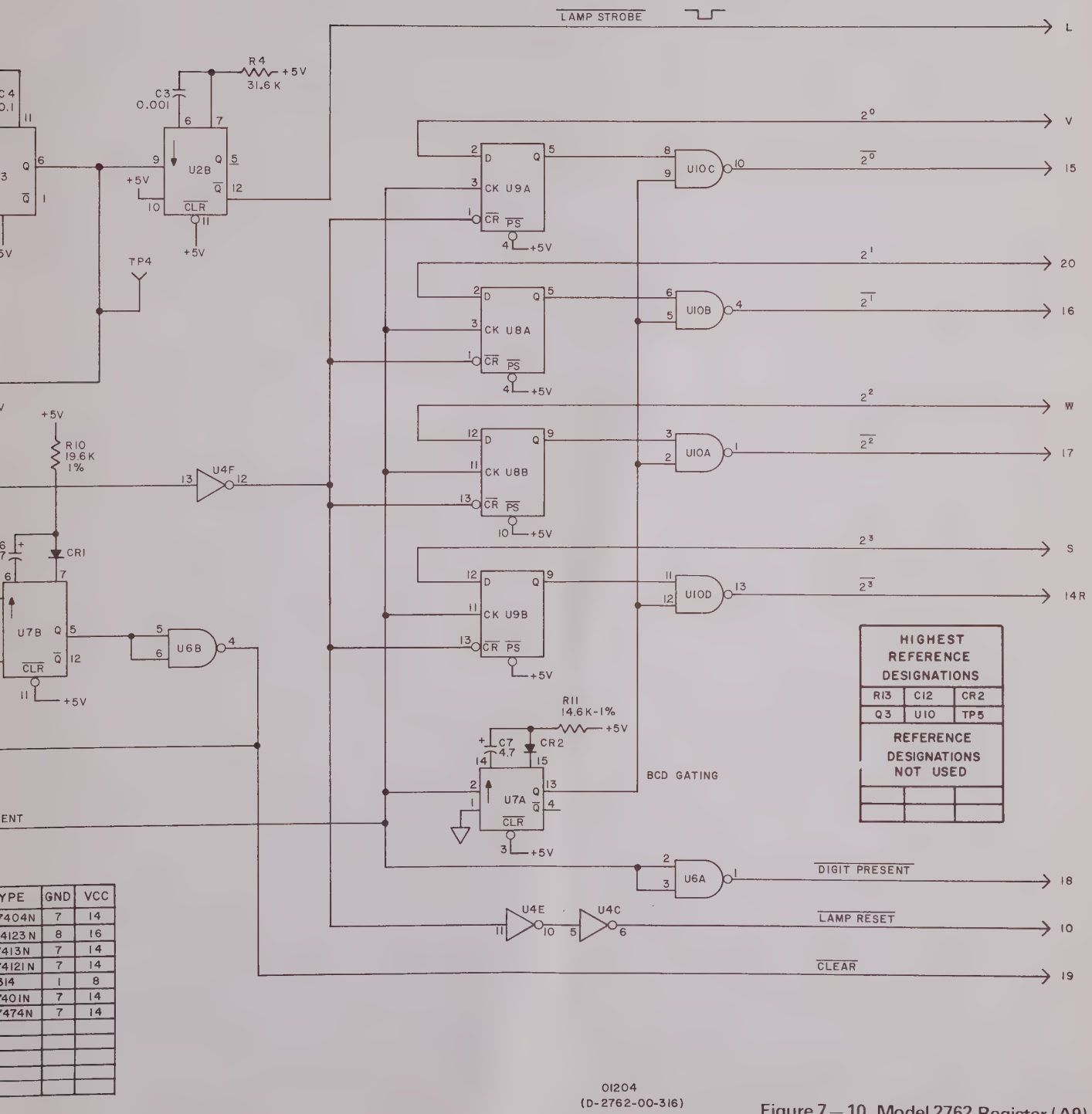
Figure 7 – 9. Model 2762 MF Decoder (A8) Schematic Diagram.

NOTES:

1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
   INDUCTANCE VALUES ARE IN MILLIHENRYS.
2. C9-12 ARE DECOUPLING CAPACITORS.
3. ✱ ARE SELECTED VALUES.



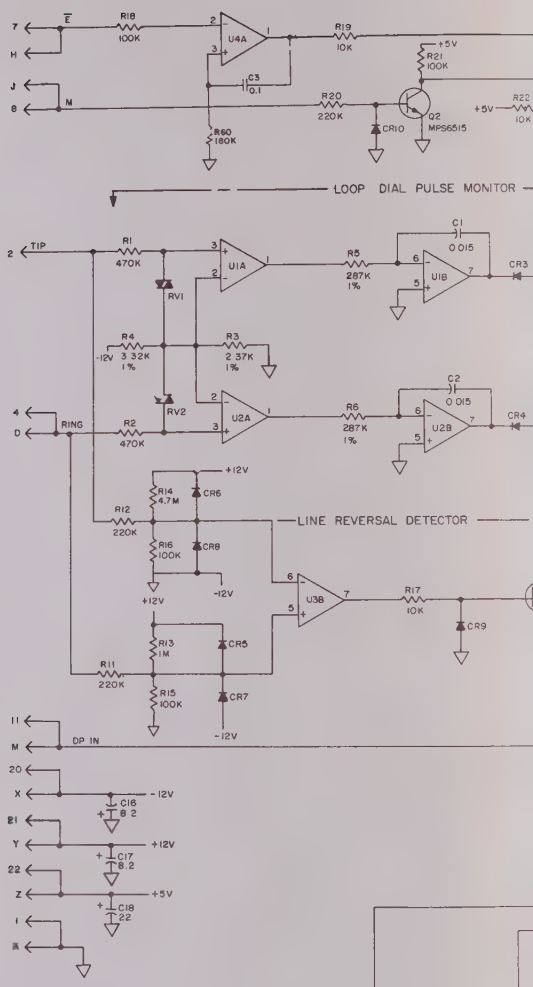
I.C.	
U4	S
U2,7	S
U1	S
U3	S
U5	S
U6,10	S
U8,9	S



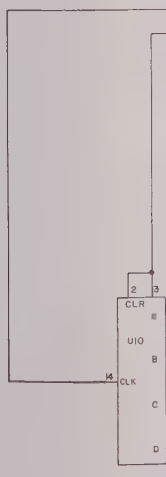
YPE	GND	VCC
7404N	7	14
4123 N	8	16
7413N	7	14
74121 N	7	14
314	1	8
7401N	7	14
7474N	7	14

01204
(D-2762-00-316)

Figure 7—10. Model 2762 Register (A9) Schematic diagram.



I.C	TYPE	GND	+5	+12	-12
1-4, 8	N5558V	—	—	8	4
5, 7, 13	CA3045	~	—	—	~
6	SN74123N	8	16	—	—
9	SN7413N	7	14	—	—
10	SN7493N	10	5	—	—
11	SN7425N	7	14	—	—
12, 14	SN7401N	7	14	—	—



NOTES:
1. UNLESS OTHERWISE INDICATED:
   RESISTOR VALUES ARE IN OHMS.
   CAPACITOR VALUES ARE IN MICROFARADS.
   ALL DIODES ARE IN4148

HIGHEST REFERENCE DESIGNATIONS		
R78	C18	CR18
U14	Q10	RV3
REFERENCE DESIGNATIONS NOT USED		
R55	C14	

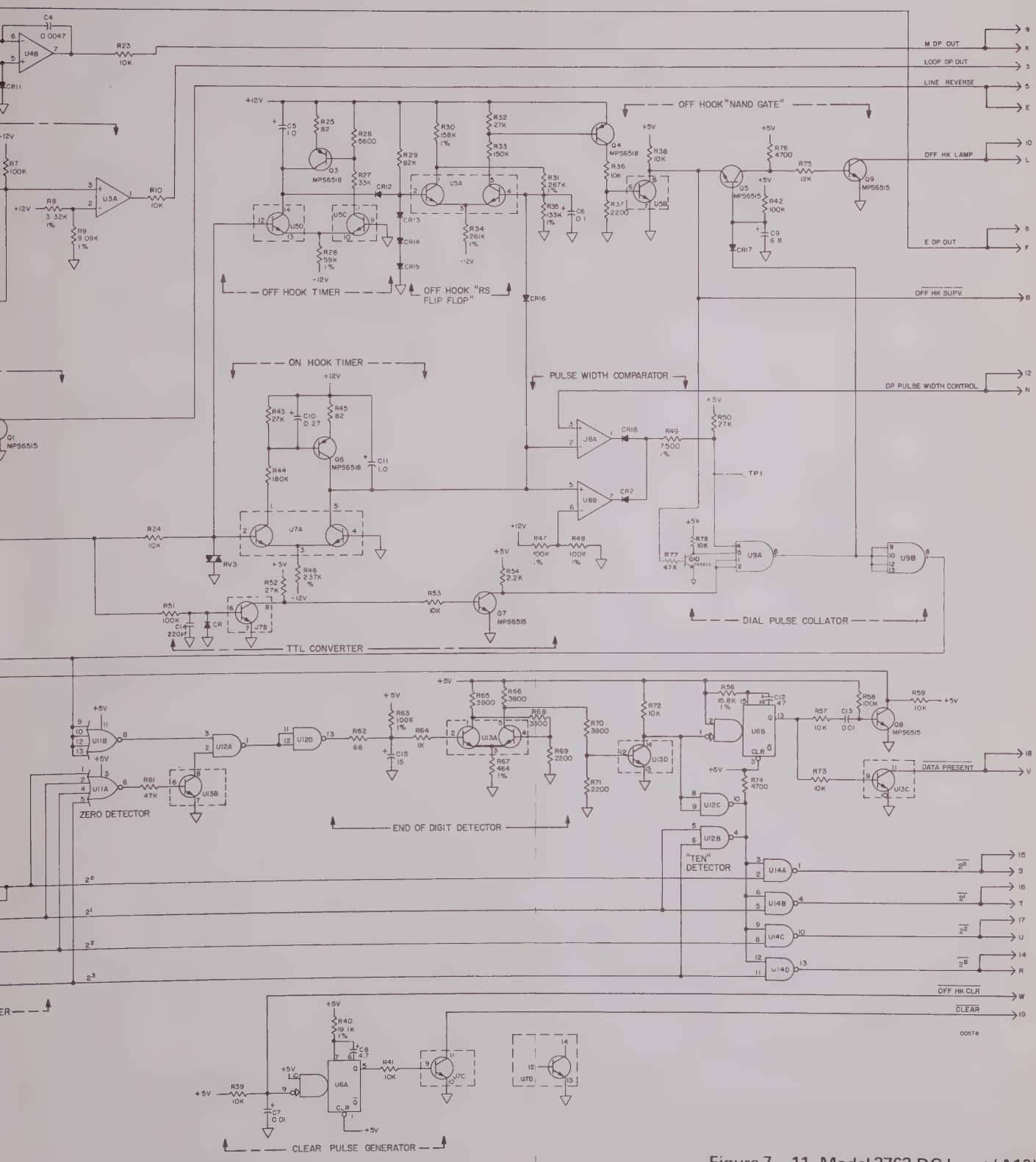
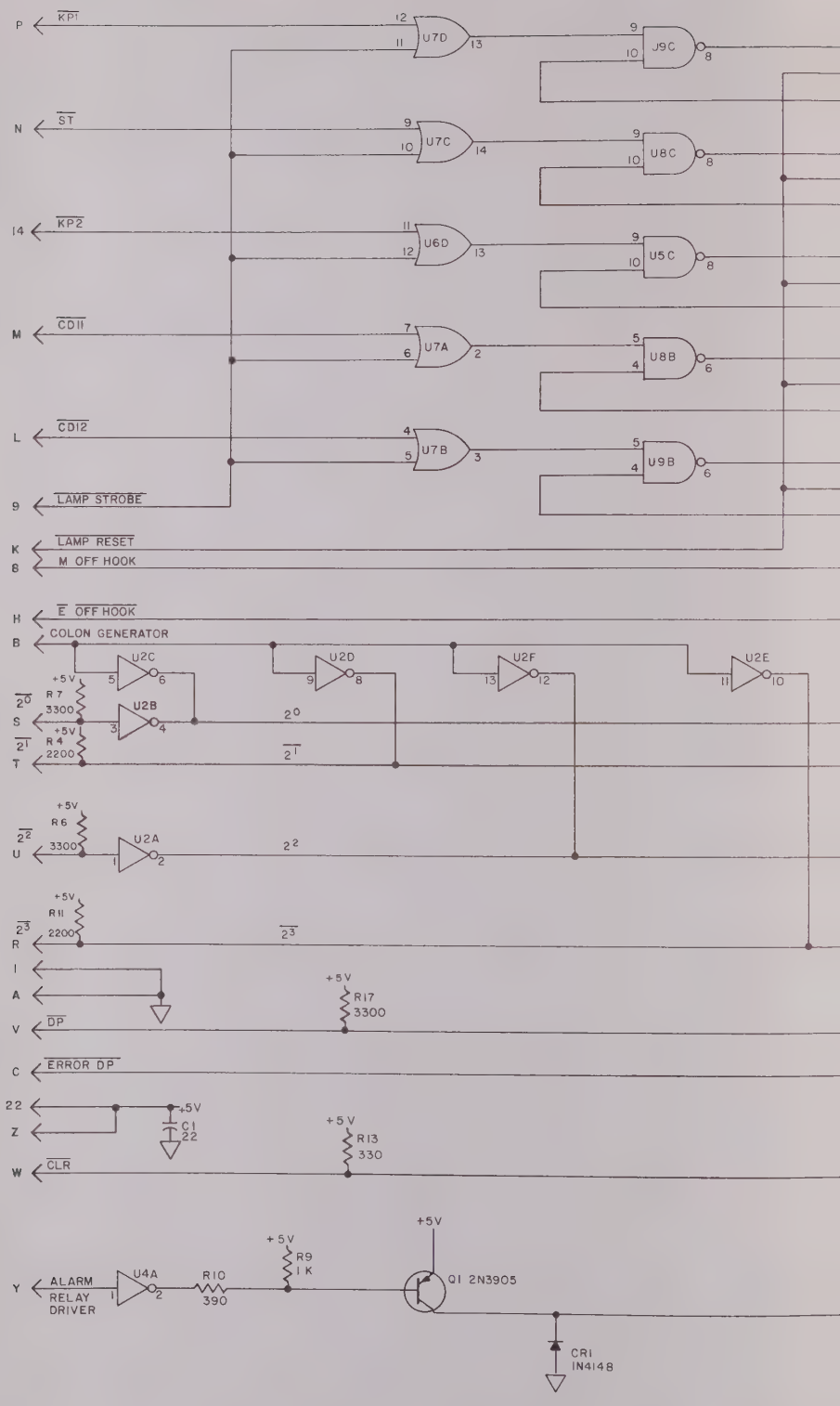
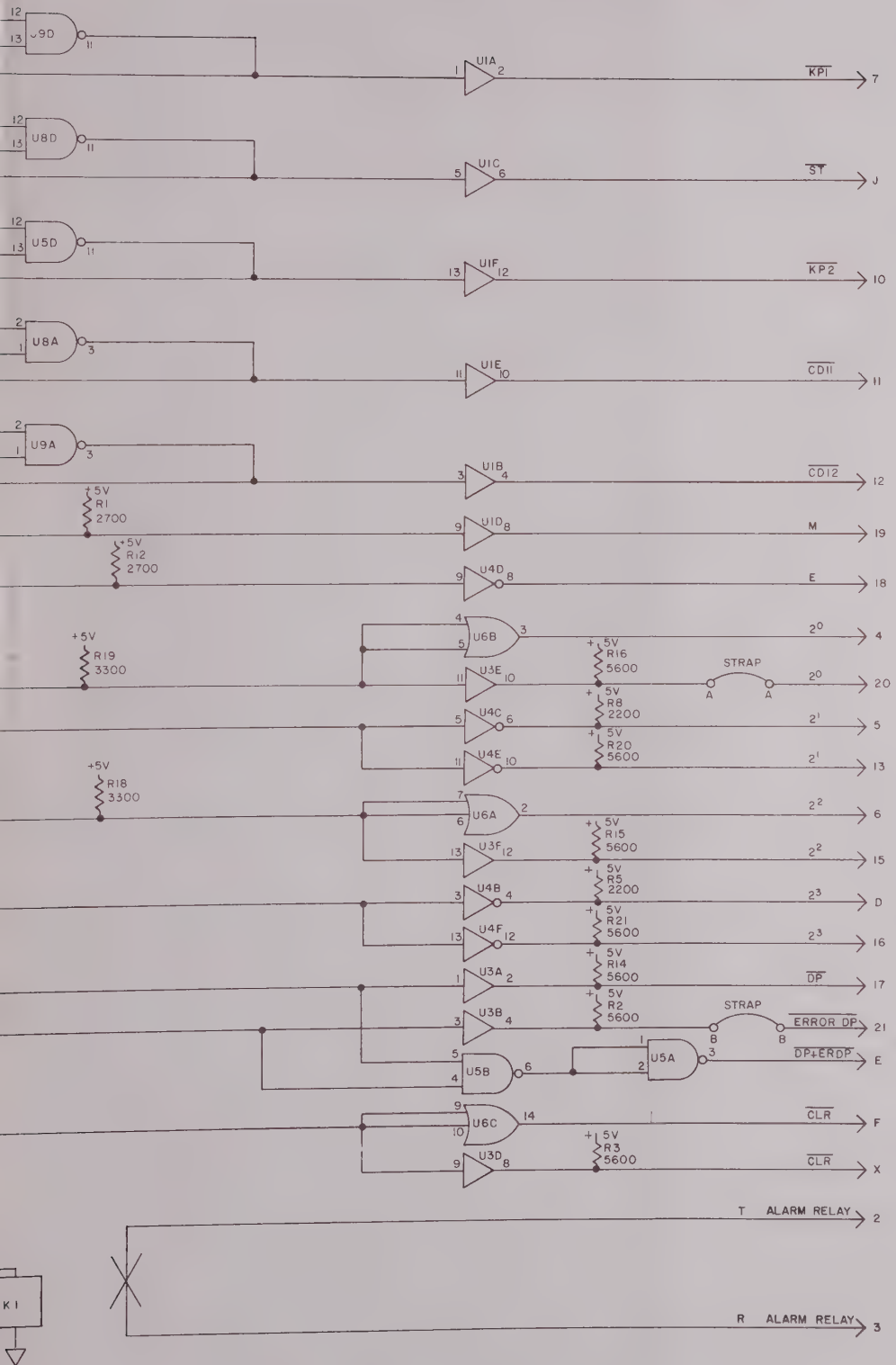


Figure 7 – 11. Model 2762 DC Input (A10) Schematic Diagram.


P
KP1
U7D
N
ST
U7C
14
KP2
U6D
M
CD11
U7A
L
CD12
U7B
9
LAMP STROBE
K
LAMP RESET
8
M OFF HOOK
U9C
U8C
U5C
U8B
U9B
H
E OFF HOOK
B
COLON GENERATOR
U2C
U2D
U2F
U2E
+5V
R7
3300
U2B
S
R4
2200
T
U
R6
3300
U2A
R
R11
2200
I
A
V
DP
R17
3300
C
ERROR DP
22
Z
C1
22
W
CLR
R13
330
Y
ALARM
RELAY
DRIVER
U4A
R10
390
R9
1 K
Q1 2N3905
CR1
IN4148



HIGHEST REFERENCE DESIGNATIONS		
U9	R21	Q1
K1	CR1	C1
REFERENCE DESIGNATIONS NOT USED		
	U3C	

I.C.	TYPE	GND	VCC
U6,U7	SP384	1	8
U5,U8,U9	SN7400N	7	14
U1, U3	SN7407N	7	14
U4	SN7406N	7	14
U2	SN7405N	7	14

NOTES:
1. UNLESS OTHERWISE INDICATED:
RESISTOR VALUES ARE IN OHMS.
CAPACITOR VALUES ARE IN MICROFARADS.
INDUCTANCE VALUES ARE IN MILLIHENRYS.

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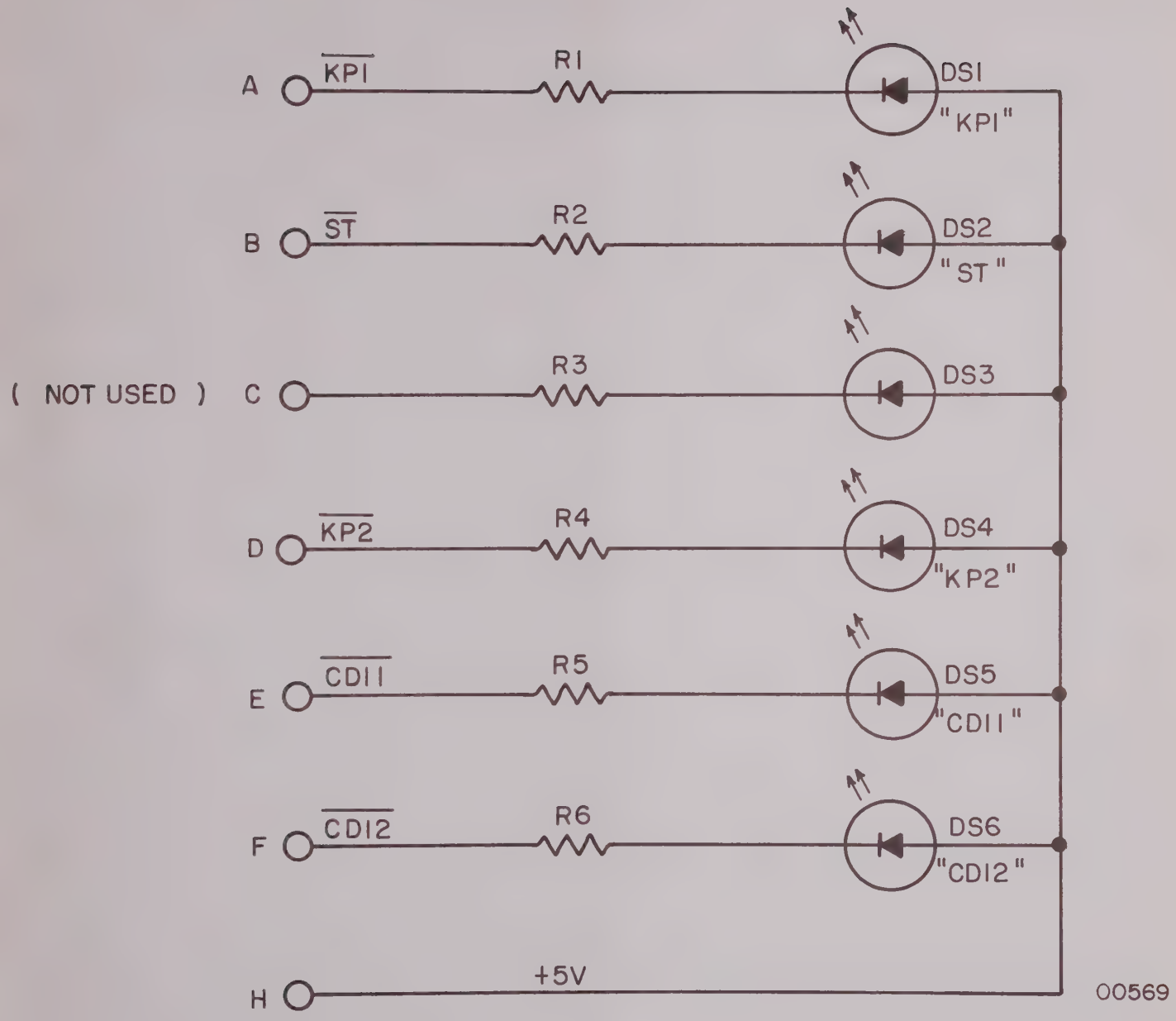
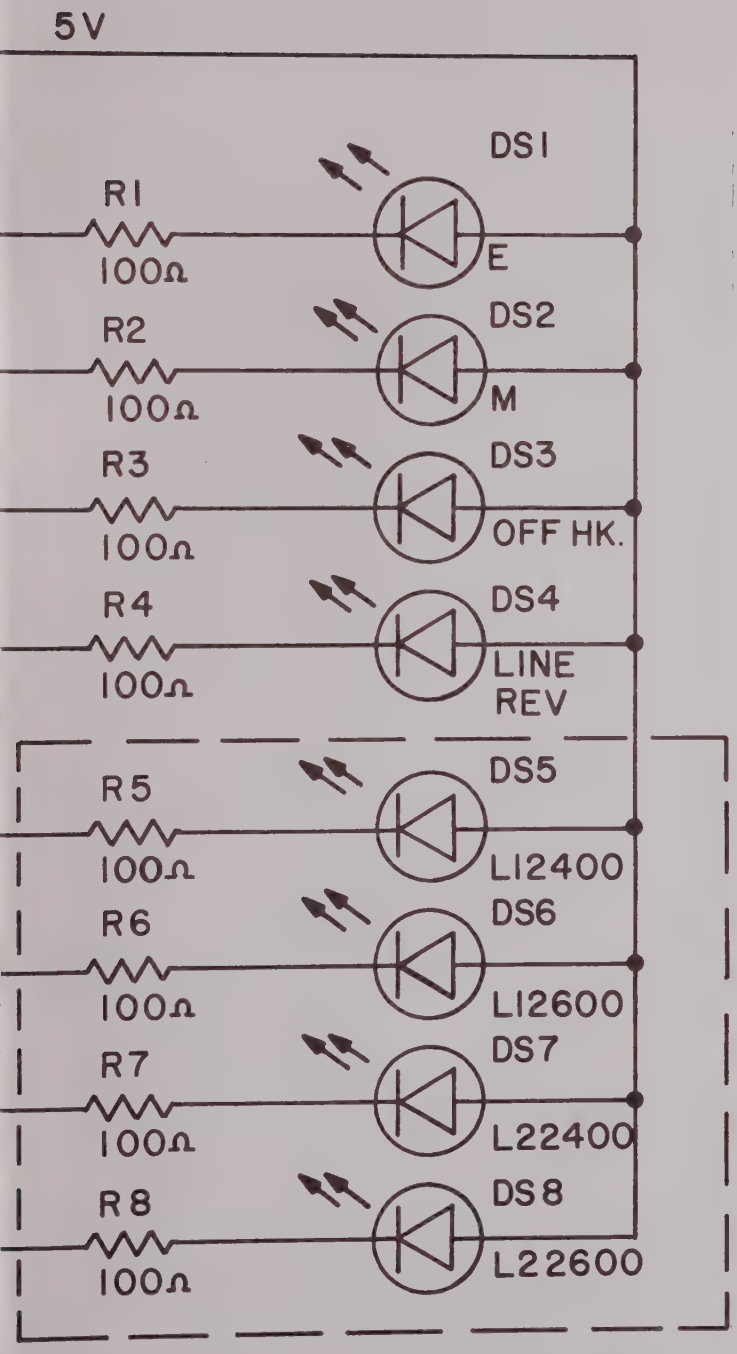
Figure 7 – 12. Model 2762 Buffer (A11) Schematic Diagram.



NOTE:

ALL RESISTORS ARE 100 OHMS.

Figure 7 – 13. Model 2762 Code Lamp (A13) Schematic Diagram.



NOTE

THOSE COMPONENTS (R5-8, DS5-8) WITHIN DOTTED LINES INCLUDED IN OPTIONS 4 AND 5 ONLY

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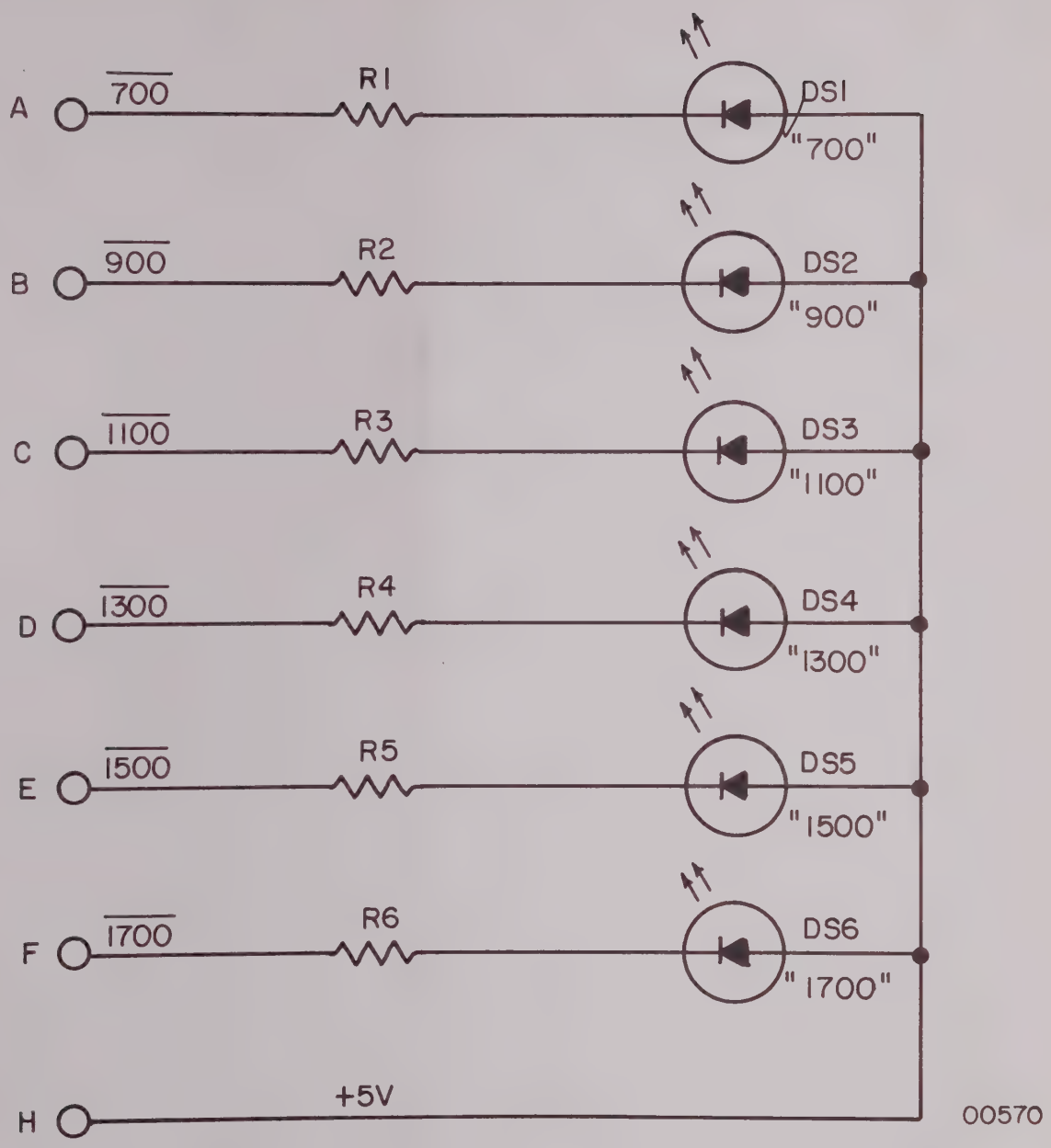
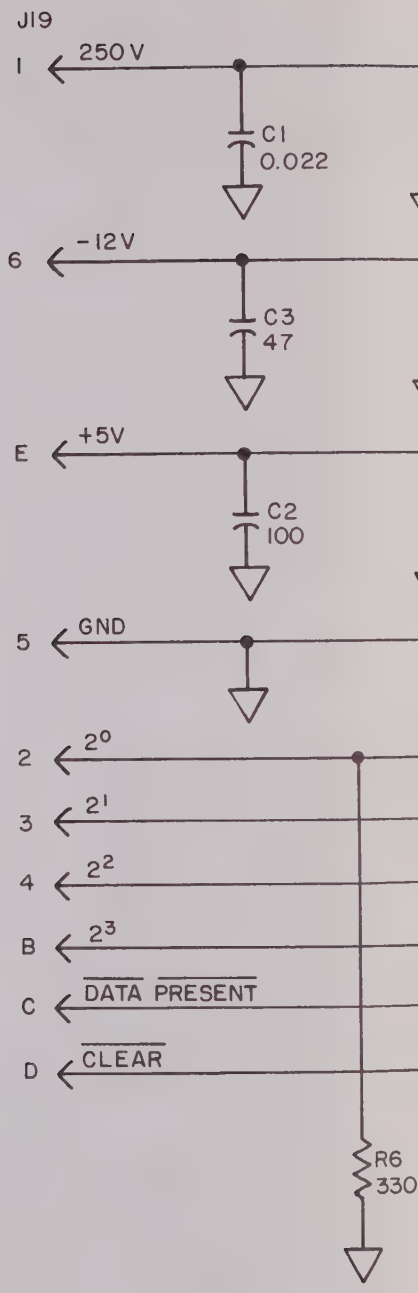
Figure 7—14. Model 2762 Supervision (A14) Schematic Diagram.



NOTE:
ALL RESISTORS ARE 100 OHMS.

Figure 7 – 15. Model 2762 Frequency Lamp (A15) Schematic Diagram.



NOTES:
1. UNLESS OTHERWIS
RESISTOR VALUES
CAPACITOR VALUES

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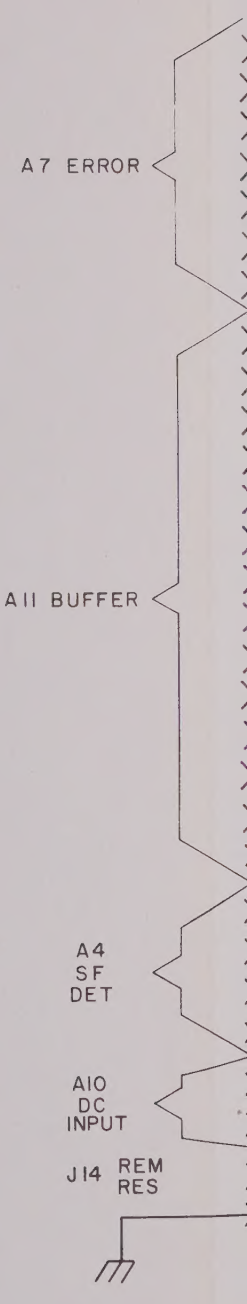
INDICATED:
RE IN OHMS.
ARE IN MICROFARADS.

Figure 7—16. Model 2762 Termination (A16) Schematic Diagram.


A12
A7 ERROR
A11 BUFFER
A4
SF
DET
A10
DC
INPUT
J14 REM
RES
NOTE:

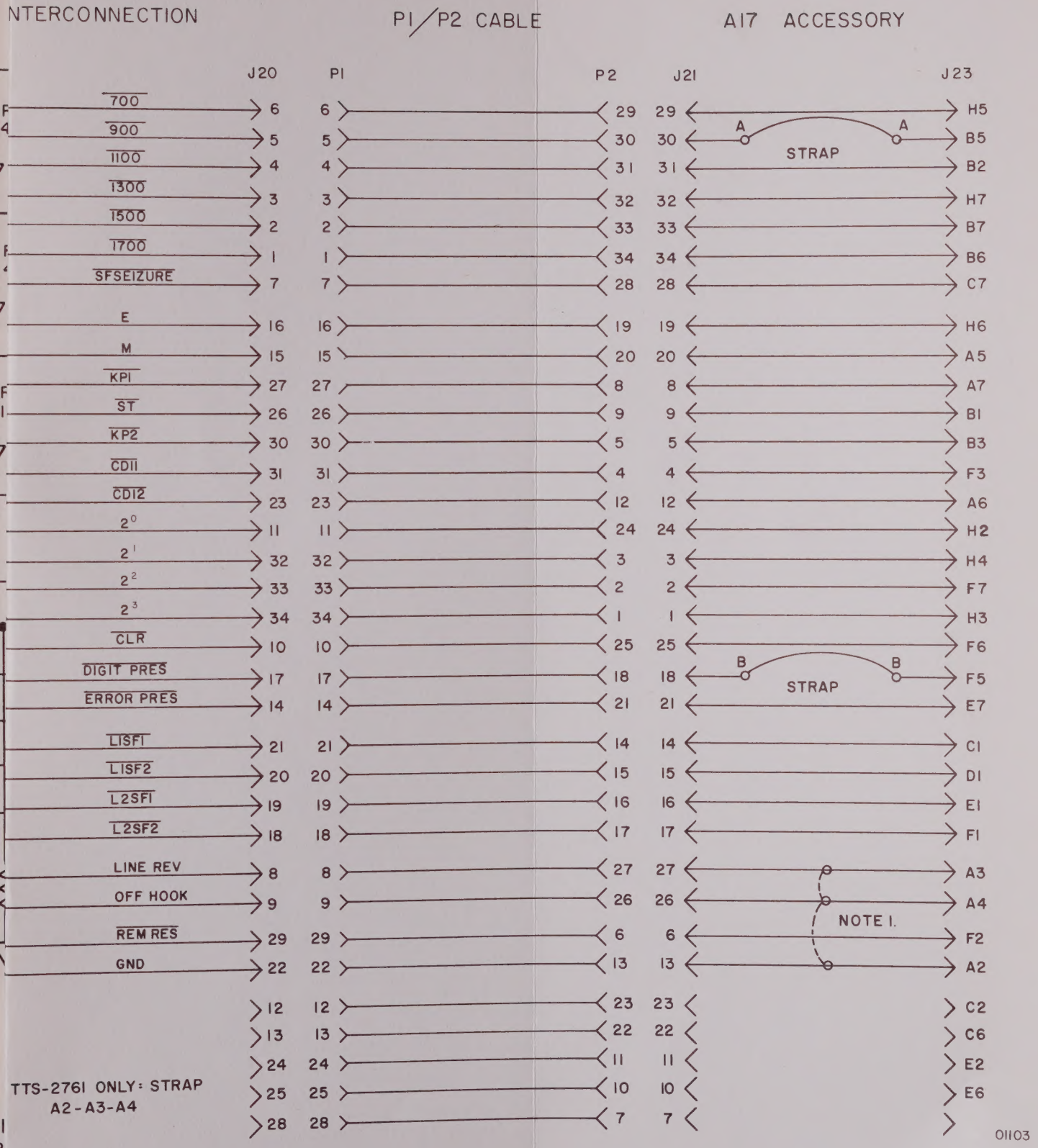
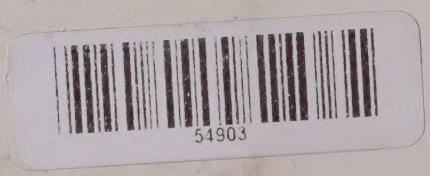


Figure 7–17. Model 2762 Accessory (A17) Schematic Diagram.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